WINTER 2024

The Bent

Of Tau Beta Pi

THE ENGINEERING HONOR SOCIETY

Prepare for the April Eclipse

2023 Convention Review

Artwork Conservation

The Bent

Tau Beta Pi

The Engineering Honor Society

Tau Beta Pi was founded at Lehigh University, South Bethlehem, PA,
June 15, 1885, by Edward H. Williams Jr., A.B., A.C., E.M., Sc.D., LL.D. (1849-1933).
Key and name registered in U.S. Patent and Trademark Office.

Member, *American Society for Engineering Education*;
co-founder *Association of College Honor Societies*; and
Affiliate, *American Association for the Advancement of Science.*

On the COVER: There will be a total eclipse of the sun on Monday, April 8, 2024. Our own Trudy Bell, an eclipse enthusiast, provides tips for enjoying the solar system's greatest show on earth. Read the article on page 40.

Artist: Dali Polivka

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See back inside cover for listing of Tau Beta Pi chapters.

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The Bent

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COUNCIL'S CORNER

Ron M. Hickling, *CA E '80*, ΤΒΠ 2023 Vice President

IDENTITY: AS AN ASSOCIATION, HOW DO WE SEE OURSELVES?

"Without knowing what I am and why I am here, life is impossible." — Leo Tolstoy, *Anna Karenina*

As part of a visioning exercise the Executive Council (EC) conducted in January, we identified some key markers of the health of our Association. These were introduced by Councillor Joan Sciacca in the Spring 2023 issue and are visually represented by the Bent shown in Figure A on page 12. **Why is "Identity" at the top of this Bent?**

We have been examining our "image" for several years as part of our Image and Marketing initiatives throughout our organization. These efforts have involved the EC, ΤΒΠ Headquarters' staff, and committees of the Convention. They have been targeted toward putting forth a welcoming and (perhaps) relatable face of our Association to the thousands of students who consider joining every year. And we are doing so in an environment where a sizable fraction of the population is skeptical about scientific "experts." According to a 2019 Pew Research poll, a significant fraction of people identifying with both political parties (66% of one, 45% of another) believe "Scientific experts are no different or worse at making science policy decisions compared with other people." Further still, there is also cynicism about honor societies in general as simply being another opportunity for the privileged few to assert their privilege over those who do not have (and perhaps never will have) the opportunity to compete for such honors.

So what is the difference between "Identity" and "Image?" These might be good working definitions: "Identity" is the way we see ourselves, and "Image" is the "self" that we project to others. When we know who we are and project that "self" to others, we have the power of being genuine and people respond. When we are confused about who we are and simply put forth an image because we believe it will "sell," then the message becomes "weak tea" and is lost in the noise. Worst of all, if we try to put forth an image that conflicts with what we stand for merely because it "sells," then we are a fake. And a fake is eventually spotted.

During our recent Convention in Atlanta, I had the opportunity to converse with and listen to a talk by **Dennis D. Truax, Ph.D., P.E.,** *MS A '78*, former ASCE President. The whole presentation envisions a future that I found really exciting, but what captured my attention immediately was his first slide:

- "The why" – not the "how" is what motivates followers
- Share the passion
- Create a movement

If ever there were a time in need of a "movement" it is **now**. The preamble to the Constitution is pretty clear for what purpose Tau Beta Pi was founded, "... to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges." I often wondered, though, what founder Williams would have added if the next sentence in the preamble were **"We do this in order to ...?"** What would your answer be?

The Association has dramatically grown in its structure since the formal adoption of the District Program in 1978. The emphasis at that point in our history was to improve the operation of our student chapters in support of their primary function — the identification and initiation of new members. That primary function is still vital to us since new members form the "life's blood" of the Association. But the programs that have been introduced since (Fellowship & Scholarship, Engineering Futures, expansion of chapter support through NICE, MindSET, NEST, and GIG grants) have all had a vision that goes far beyond our basic function of initiating new members. Many of them envision engaging an audience outside the "engineering colleges" to the world beyond the university or even beyond the narrow confines of technology itself.

What will guide us in this odyssey is a solid sense of who (and why) we are. By establishing and projecting this identity, we can form partnerships, motivate alumni, communicate with potential new members and donors with conviction. As a bigger community comes to understand "why we matter" the value of our brand will increase, benefiting not only chapters in recruiting new members, but also benefiting our new members by opening doors as they pursue their careers.

Committees at the most recent Convention have already started contemplating the question of ΤΒΠ's identity. Encapsulating everything that we are is not an easy task, but I propose our ritual is a good place to start. When was the last time you attended an initiation ceremony and considered the beauty of all the ideas therein? It expresses our values, for sure (captured in our public creed "Integrity and Excellence in Engineering"), but I believe it also commissions us to respond to the honor we have been afforded by reaching out and doing things to promote those values.

In the end, we will be judged as an organization by *what we do* and *why we do it* — so perhaps it is there that our identity lies.

RON HICKLING, a senior systems engineer for Creative Digital Systems Integration, developing digital beam forming antennas, has a B.S. in electrical engineering from the University of California, Los Angeles. He began his career at Hughes Aircraft Co. as a Hughes Masters Fellow, co-founded startup TechnoConcepts, Inc., and is a senior member of IEEE. He joined the ΤΒΠ Executive Council in 2021.

FROM THE EDITORS

Dylan Lane and **Patricia McDaniel**

Tau Beta Pi's Identity and Image were formal topics of discussion in several committees, the president's address during the recent Convention in Atlanta, and in Vice President **Ron Hickling's** Council's Corner. Ron defines the difference between the two in simple terms: "Identity" is the way we see ourselves and "Image" is the 'self' that we project to others. "In the end, TBΠ will be judged by '*what we do* and *why we do it.*'"

The Bent plays an integral part of conveying and supporting our identity and image of a community of life-long learners, engineers committed to technical excellence, high standards, service, and integrity. In this issue's Convention recap, you witness a unique aspect of TBΠ's identity: governance not only by an executive body, but by voting delegates, the majority of whom are students.

Another defining characteristic of TBΠ is being the *only* society honoring engineers of all disciplines, which gives this publication the freedom to cover a broad spectrum of interests to engineers. For example, in her article on artwork conservation and attributions, **Bridget Moorman** presents the third feature about the role of engineering in creative industries. **Lyle Feisel** delivers another excellent installment of his "Why do we call it a..." series on the Gauss. And we celebrate the return of popular contributor, **Trudy Bell**, with a thorough overview of the upcoming eclipse of the sun in April. She will appear in the Spring issue with an article inspired by her successful knee replacement.

We hope you enjoy this issue.

The staff at TBΠ *HQ send sincere, warm wishes to you and yours for a safe and joyous holiday season, and a healthy and successful New Year.*

Correction:

In the Fall 2023 issue, there was some confusion regarding the athletic career of 2023 Laureate **Mitchell Sueker,** *SD A '23.* Here's the correct information: Mitchell used two years of athletic eligibility while at SD Mines, but was part of the program his first year as a medical redshirt recovering from a lingering high school injury. After transferring to the University of North Dakota, Mitchell played for the Div. I men's basketball team for three years (two years of eligibility remaining and then one extra year of eligibility due to COVID).

Thank you to our readers for helping maintain the accuracy of the magazine. If you find an error or inconsistency, please email tbp.media@tbp.org *or call 865/546-4578.*

HEADQUARTERS WELCOMES NEW STAFF MEMBER:

Ryan Hubbuck joined the team at HQ in May as Webmaster. He attended the University of Tennessee before transferring to Roane State to earn an AAS as a physical therapist assistant. Ryan is currently working on a B.S. degree in computer science from Southern New Hampshire University and expects to graduate in 2024.

Ryan has always had a passion for technology and initially began learning programming as a hobby. For the past five years, he has been building websites and applications in a freelance capacity and transitioned into the field full-time in 2022 as an associate software engineer with Tombras advertising agency in Knoxville.

In his free time, Ryan enjoys rock climbing, building computers, playing video games, and being outdoors with his dog Ellie.

More information about the TBP HQ staff is available on our website: www.tbp.org/?HQBios

WHO'S WHO IN TAU BETA PI

Recognizing Tau Bate accomplishments.

Robert W. Conn Ph.D.

New York Lambda '64

was selected to receive the prestigious Simon Ramo Founders Award for 2023, given by the National Academy of Engineering. He is being recognized for "shaping national science and technology policy through leadership in academia, business, and philanthropy, and for seminal contributions to fusion engineering. Now Dean Emeritus, Robert was the first dean of UC San Diego's School of Engineering.

Peyman Givi Ph.D.

Ohio Lambda '80

for his contributions to the aerospace community, was selected to present the 2024 Dryden Lecture in Research, by the honors and awards committee and Board of Trustees of the American Institute of Aeronautics and Astronautics. He is a Distinguished Professor at the Univ. of Pittsburgh and his lecture will be presented at the 2024 AIAA Science and Technology Forum and Expo January 8-12, in Orlando.

Col. Nicole A. Mann USMC

Maryland Gamma '99

was selected as a 2023 Women of the Year national honoree by *USA Today* and cited as the "first indigenous woman to travel to outer space." A U.S. Marine Corps Colonel, Nicole served as Mission Commander of NASA's SpaceX Crew-5 mission, where she spent six months aboard the ISS as part of Expedition 68. She's registered with the Wailacki of the Round Valley Indian Tribes and has B.S. & M.S. degrees in MechEng.

Brett F. Myron Ph.D., P.E.

Washington Beta '96

was promoted to CEO of PETRA, Inc., a contracting firm in the western U.S. He has worked at PETRA for 18 years, previously as president, and is also a co-owner. Brett is a civil eng'g graduate of Washington State Univ., has 30 years of construction industry experience, and has overseen the successful completion of several significant projects, including the construction of The Logistics Readiness Center at Mountain Home Air Force Base.

Marjan Rafat Ph.D.

Massachusetts Beta '06

received the Young Innovator Award from the Cellular and Molecular Bioengineering division of the Biomedical Engineering Society. The award is a distinguished honor for young faculty in the biomolecular engineering field. She was cited for her research "at the interface of engineering, cancer, and immunity." Marjan is an assistant professor at Vanderbilt University and serves as TN Beta Chapter Chief Advisor.

C.K. Ken Yang Ph.D.

California Gamma '92

was selected to join the National Academy of Inventors 2023 class of senior members. He is a professor and chair of the UCLA electrical and computer engineering department. Earlier this year, Ken also received a Distinguished Engineering Educator Achievement Award from the Engineers' Council for leadership in mentoring students and creating an innovative electrical and computer engineering curriculum.

Statement of Ownership, Management & Circulation

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Total distribution	80,053	80,032
Copies not distributed	272	110
Total	80,325	80,142

I certify that the statements made above are correct and complete. —*Curtis D. Gomulinski, Executive Director*

MIT TECHNOLOGY REVIEW MAGAZINE 35 INNOVATORS UNDER 35

In September, the annual list of *MIT Technology Review*'s 35 Innovators Under 35 was announced. This year's innovators comprise five categories: Artificial Intelligence, Climate and energy, Computing, Biotechnology, and Robotics. Profiles of the seven Tau Bates selected follow:

Nicole L. Black 1 Ph.D.

Massachusetts Eta '14

(Biotechnology) Nicole is vice president of biomaterials and innovation at Desktop Metal and previously founded Beacon Bio to commercialize a biomimetic hearing-restoration technology developed at Harvard as a graduate student. The core technology, the PhonoGraft device, is a 3D-printed, bio-compatible graft that can be implanted to repair a damaged eardrum. Beacon was acquired by Desktop Health shortly after launch. Her B.S. degree in biomedical eng'g is from Boston Univ. and is a ΤΒΠ Scholar (2013).

Connor W. Coley 2 Ph.D.

California Beta '14

(Artificial Intelligence) Connor, an assistant professor at the Massachusetts Institute of Technology (MIT), developed open-source software that uses artificial intelligence to help discover and synthesize new molecules. The suite of tools, called ASKCOS, is used in production by over a dozen pharmaceutical companies, and tens of thousands of chemists, to create new medicines, new materials, and more efficient industrial processes. His three degrees are in chemical eng'g from Cal Tech (B.S.) and MIT (M.S. and Ph.D.).

Julia Joung 3 Ph.D.

California Gamma '13

(Biotechnology) Julia is a postdoctoral fellow in the MIT Jonathan Weissman lab. She created an "atlas" to help scientists see how specific proteins shape cells into muscle, neurons, and more. Supplies of specific cells could be useful for testing drugs or new types of therapies. A former semi-pro Go player, Julia observed unusual behavior in brain cells called astrocytes during her undergrad research at Stanford and then continued her research, as a Ph.D. student, at the Broad Institute in the lab of gene-editing expert Feng Zhang.

David G. Mackanic 4 Ph.D.

Virginia Beta '15

(Climate and energy) David founded and serves as CEO of Anthro Energy, where he is "unlocking new possibilities in electronics by building batteries that can bend and flex." The batteries use an electrolyte made from a synthetic polymer, which allows it to bend without inhibiting performance. He was also named a featured honoree for the 2021 *Forbes* "30 Under 30," earned a B.S. degree in mechanical engineering from Virginia Tech, and completed his Ph.D. in chemical engineering at Stanford University.

Forrest E. Meyen 5 Ph.D.

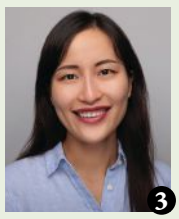
Missouri Alpha '11

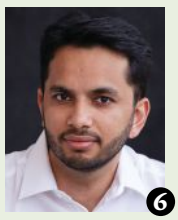
(Robotics) Forrest is a co-founder and chief strategy officer of the space robotics company, Lunar Outpost, a provider of commercial planetary surface mobility. In addition, he works as a NASA science team member on MOXIE, a toaster-sized device that went to Mars in 2021 aboard the Perseverance rover. Forrest's work could make space exploration more affordable and boost the space mining industry. He has a B.S. degree in mechanical eng'g from the Univ. of Missouri-Columbia and aero and astro eng'g M.S. and Ph.D. degrees from MIT.

Pranav Rajpurkar 6 Ph.D.

California Gamma '15

(Artificial Intelligence) Pranav has developed a way for AI to teach itself to accurately interpret medical images without help from humans. He is an assistant professor of biomedical informatics at Harvard Medical School and leads a lab dedicated to advancing medical artificial intelligence. Pranav was a 2022 *Forbes* "30 Under 30 in science" honoree, has published 65+ academic papers that have received more than 19,000 citations, and received his B.S., M.S., and Ph.D. degrees, all in computer science from Stanford University.





Victoria Webster-Wood 7 Ph.D.

Ohio Alpha '12

(Robotics) Victoria, an associate professor at Carnegie Mellon University, has built a range of robots of biological materials, with the aim of making robotics more environmentally friendly. These feats have strongly influenced the emerging field of biohybrid robotics. She received support as an NSF Graduate Research Fellow, ΤΒΠ Fellow in 2015, and GAANN Fellow in the Biologically Inspired Robotics Lab at Case Western Reserve Univ., where she earned B.S., M.S., and Ph.D. degrees in mechanical eng'g.

PART OF A SERIES ON HOW ENGINEERING SUPPORTS THE CREATIVE INDUSTRIES AND ARTS

Figure 1

Engineering and Cultural Heritage Conservation and Attribution of Artworks

BY BRIDGET A. MOORMAN, COL., USAF (RET.), *ARIZONA BETA '85*

Introduction

In 2021, the global artwork market was estimated to be worth $67.8B. In order to sustain this market, especially in light of the high incidence of fake artwork recently discovered in museums as well as meet societal culture goals, conservation organizations and attribution processes use technologically advanced tools in their tasks.

Cultural Heritage Conservation

The American Institute for Conservation and the Foundation for Advancement in Conservation defines conservation as encompassing "all those actions taken toward the long-term preservation of cultural heritage for future generations. Activities include examination, documentation, treatment, and preventive care, supported by research and education."[1] Conservators can specialize in a specific area such as archaeology, artworks, book and paper, architecture, electronic media, etc. Based on the specialty, specific tools are used in artwork preservation and attribution. These tools range from micro destructive sampling techniques, to non-destructive imaging techniques, to the use of machine language processes for algorithm development in attribution and image processing. All of these tools and techniques are very similar to those used in other industries, they are merely applied for use in the art world.

Sampling and Sample Testing

Before the use of non-destructive imaging and computational techniques in the field of cultural heritage conservation and attribution, micro samples were taken of the artwork in question and then studied microscopically or with a mass spectrometer. These tests would be used to determine the types of materials used by an artist, for example, the palette they used, the substances in the paint used to derive the pigments, the surface preparation for their painting, and any degradation that could be detected over time.[2] They could also help to date the artwork, assisting in the attribution task. The samples and their analysis also assist conservators in determining what material they should use when conserving or preserving an artwork.

Non-Destructive Imaging Techniques

Over years, many different types of electromagnetic spectrum analyses have been adopted for use in art preservation, attribution, and cultural heritage conservation tasks. The specific spectrums used range from ultraviolet (UV), visible, near infrared (Near IR), short-wave infrared (SWIR), x-ray, and terahertz (THz). Multispectral and Hyperspectral image (MSI/HSI) analyses combine the use of different spectrums and allows for better analysis as "each material reflects, absorbs, and emits electromagnetic radiation according to its molecular composition and shape."[3] The multispectral/hyperspectral images can be acquired with frame cameras or scanning devices with single or linear arrays of sensors.

Figure 1 on page 6, Spectral Scanning Device being used on Rembrandt's *The Night Watch* painting, Rijksmuseum. Image used courtesy of Bridget A. Moorman.

Figure 1 shows a scanning device being used on Rembrandt's *The Night Watch* painting at the Rijksmuseum. The basic physics of the non-destructive imaging technique relies upon how a material will absorb, reflect and/or transmit the frequency being projected onto the material. In **Figure 2** the sensors detect the reflectance spectra of each pixel that is scanned resulting in a file-cube which has the spatial coordinates (x,y) and one spectral coordinate (wavelength – λ).

Figure 3 shows how the different wavelengths penetrate the different layers of a painting. By being able to visualize the layers underneath what is currently visible, conservationists can better date the artwork as well as detect any degradation due to aging, environment (where displayed or stored), and previous conservation efforts. As per the figure, THz penetrates to the preparation layer, while the IR, Visible, and UV investigate higher layers of the painting, with x-rays revealing the lower support layer.

Each of these spectra also have specific information they are better suited to acquire. The visible spectrum is used mainly to record the color and spatial information about the painting. The short-wave infrared region (SWIR – 1000-1700 nm) excels at highlighting underdrawings or pentimenti. This layer also can reveal underpaintings that have been covered over with the currently visible paint layer. Visible and near infrared (400-700 nm and 700-1000nm, respectively) are used for detection of surface defects, paint pigments, and cracks. This range also can detect "false colors" which in the visible spectrum may look the same, but in the IR spectrum have a different behavior.

As an example, this can indicate that a conservationist may have accurately depicted the correct visible color, but used a different set of substances in the paint to achieve the pigments. These surface and subsurface features can also reveal stylistic techniques of the artist. In the THz imaging range, conservationists are able to discern different surface layer preparation of the wood (or canvas) indicative of a specific school or art timeframe by comparing the different surface preparation techniques used in different times, such as medieval versus renaissance. This also helps with dating and attribution.[4,5,6,7,8,9]

VISUAL-PHOTOGRAMMATIC FOR 3-D IMAGING AND RECONSTRUCTION

In a quasi-related approach to spectroscopy for 2-D art, a photogrammetric (visual) technique was used for 3-D imaging and reconstruction of historical monuments for virtual reality/museum purposes and historical information/preservation. In the photogrammetric approach, an immersive 3-D representation of the "Fontana Maggiore" in Perugia was created. 564 photographs were taken of the fountain at different perspectives with the same photo parameters: ISO sensitivity, focal length, exposure time, and aperture. In order to obtain a good 3-D visual model with this technique, there needs to be large overlaps (70%) between successive photographs. This allows for a stereoscopic set of data from which can be derived the 3-D model. The photos were then processed in a photogrammetry software to build the 3-D visual model. This photogrammetric technique was able to produce enough resolution such that an observer felt immersed in the scenario.[10]

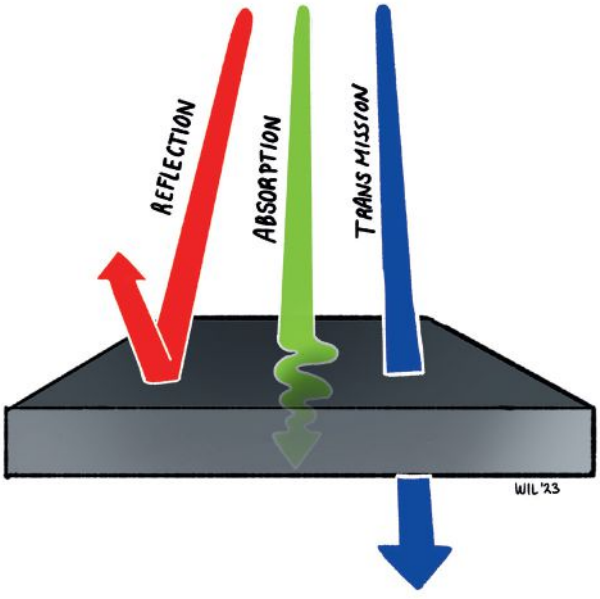


Figure 2. How material will reflect, absorb, and/or transmit non-destructive imaging frequencies/spectras. Image by Wilhelmina Hill-Bearhs.

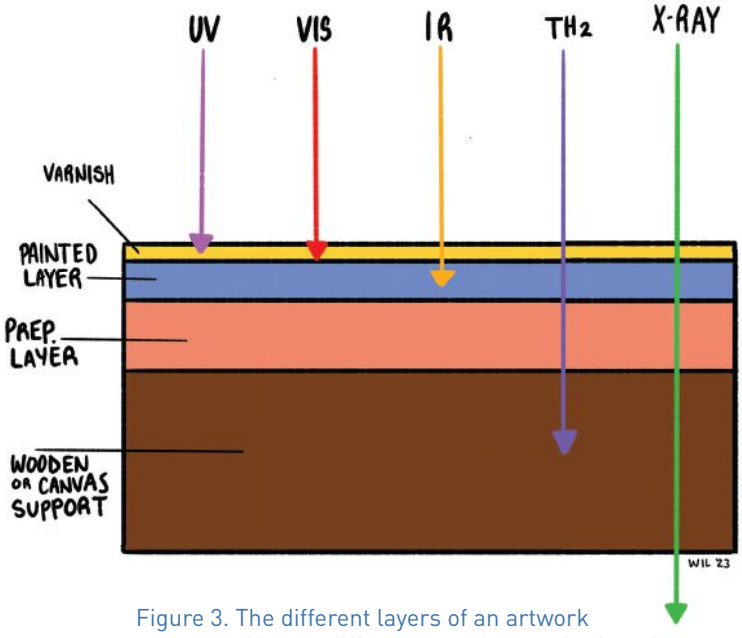


Figure 3. The different layers of an artwork penetrated by the different non-destructive imaging spectra techniques. Image by Wilhelmina Hill-Bearhs.

"By being able to visualize the layers underneath what is currently visible, conservationists can better date the artwork as well as detect any degradation due to aging, environment, and previous conservation efforts."

ATTRIBUTION AND MACHINE LEARNING TECHNIQUES

The authentication and attribution of artwork is a precarious task, especially lately. In 2018, it was estimated that 20% of the paintings in UK museums were fakes.[11] Also, in 2018, one French museum found out that 50% of its artworks were fakes.[12] In 2012, the Metropolitan Museum of Art estimated that 40% of artworks on sale were fakes.[13] This has led to an increased desire to use more scientific and objective techniques for art attribution, with one of those techniques being the use of machine learning (ML) on digital datasets of artworks.

Authentication or attribution has traditionally relied upon a combination of "scientific analysis, connoisseurship, and provenance."[14] Scientific analysis can be fooled by forgers using materials from a particular age and copying the artists' styles. Provenance relies upon documentation of ownership over the years. Connoisseurship, which relies upon experts and expert associations to be able to examine artworks for authenticity, can at times become 'tunnel-visioned' possibly leading to inappropriate behavior limiting attribution to actual artworks to ensure scarcity and concomitant increase in market prices, or mis-attribution due to human error. ML and algorithms developed by the ML techniques have become the next tool in the artwork attribution arsenal; however, this technique is not without its faults either.

MACHINE LEARNING EXAMPLES

The Department of Physics at Case Western Reserve University applied ML to "analyze topographical data obtained by optical profilometry." Surface topography "reveals unintended stylistic elements embedded in the surface of the painting that include deposition and drying of the paint, patterns in the brushwork, and physiological factors.[15]

The argument is that each artist has an unconscious 'fingerprint' attributable to their style of painting and that the brushstroke (weighting across the bristles and their flow across the canvas) and amount of paint (height of paint deposited on the canvas) used would be consistent with each artist regardless of other stylistic aspects of a painting or tools used. The unique physiological aspect could be attributed to the fine motor control of the artists' hand. They measured the surface height of each painting using a high resolution optical profilometer. They then used an ML technique of convolutional neural networks (CNN) to analyze the data. In order to avoid over-fitting of the model, they trained on a larger data set and then used the trained model to predict attribution on a smaller data set. The specific results were fairly accurate at 96.1% correct attribution. They also tested different sample size areas of the artwork for accuracy with their ML model. Their model exhibited a broad accuracy of 95% between sample sizes of 5-15 mm, which equated to between 100 and 300 pixels with their profilometry system. They also found that their model gave more accurate attribution predictions than similar ML techniques that use color metrologies versus surface height metrology.

Rutgers University and the Atelier for Restoration and Research of Paintings in the Netherlands collaborated on another application of ML techniques to determine attribution. Their premise was the 2-D strokes used by artists in drawings were unique to the artist: "the shape, tone, and relative length of the beginning, middle, and end of each stroke."[16] This stroke is the artist's 'unique unintentional signature' and is difficult to forge. They used 297 line drawings by Picasso, Matisse, Shiele, and Modigliani collected as digital images from various sources. They then commissioned five artists to make 83 drawings similar to those of the masters using the same techniques as a data set for only testing their algorithm. The masters' images and the drawing strokes were quantified and classified by studying the handcrafted features, which included the shape of each stroke and the boundary statistics, and learned representation features which covered the tone variation and local shape characteristics. The handcrafted feature data set was classified using a support vector machine (SVM), while the learned representation features were classified using a gated recurrent unit (GRU) a more complex version of a

Figure 4: On the right is the *'de Brecy Tondo'* painting, which depicts the central figures of the Renaissance master's famed *Sistine Madonna*. On the left are the two nearly identical central figures of the complete Sistine Madonna.

recurrent neural network (RNN). The training was done inter and intra-artist using both classification techniques (handcrafted and learned representation) described above. Then the fake drawings were run through the algorithm. The results showed that the handcrafted feature technique set approach rejected fake drawings with 100% accuracy, while the GRU-RNN learned representation feature technique performed poorly at detecting the fake drawings. Moreover, they were able to discriminate between different artists' drawings at the stroke level with high accuracy.

MACHINE LEARNING AND THE TRAINING SET

In an example of competing ML claims, recently a painting was attributed to one artist using one set of ML techniques while another ML technique attributed the painting to another artist. In early 2023, a painting known as the *de Brecy Tondo Madonna* was attributed with 95% accuracy to Raphael using an ML and neural network technique at Bradford University, UK, that relied upon facial recognition.[17] Three weeks later, another ML company based in Switzerland, Art Recognition, announced that they had run the painting through their ML algorithms and their prediction with 85% accuracy was that the painting was not by Raphael (**See Figure 4 above**). Art Recognition requires 200 images from a specific artist to build and train their algorithm, and uses the whole painting, not a specific portion of it.[18]

The results above caused many in the art world to call for caution in the sole use of ML algorithms for attribution of artworks. The opposing results above demonstrate that the limitations of the algorithms and training sets should be understood and that the ML techniques should currently be an adjuvant to the other techniques used in cultural heritage conservation and attribution.[19]

CONCLUSION

As with all other industries, the advent of computing and machine learning has changed the perspectives and tools used to assist in the creation, maintenance, and identification of the products in those industries. The tools used in cultural heritage conservation and attribution rely heavily upon the physical principles and engineering in the world: understanding of optics, the electromagnetic spectrum, machine learning processes and techniques, applied mathematics, data processing, and the equipment used to perform these tasks. These, combined with an understanding of art and the materials used in art, the different schools and techniques, and the different periods of art, can possibly make for a very interesting career in the creative work of art and cultural heritage conservation for an engineer.

BRIDGET A. MOORMAN, BSME, MSBME, CCE, COL, USAF (Ret.) has 30+ years' experience in the clinical engineering/digital health field working and consulting for large healthcare organizations as well as serving as chair of the board of examiners for certification in clinical engineering (2011-13). She has worked in biomechanical research, power-line relay design and space system launch, and telecommunications. As an Air Force reservist, Bridget served as IMA to the MILSATCOM Directorate. Her B.S. from Arizona State University (ASU) is in ME; M.S. in BME from Rensselaer Hartford Graduate Center; and MAS in healthcare informatics ASU College of Health. Her professional awards include the 2019 ACCE/HIMSS Excellence in Clinical Engineering and Information Technology Synergies Award. She is an Instrument Private Pilot, Single Engine Land.

See article References on page 10.

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The STORY BEHIND The PHOTO

Announcing the Winter 2024 "Caption This Photo" Contest!

From the 1990's, we fast forward to the 2023 Convention held in Atlanta, GA. Here are Executive Councillor Menna M. Youssef, Ph.D., *VA G '04*, (left) and Director of the District Program Stacey L. Forkner, *WI A '96*, practicing with a bullhorn to herd members into place for the group photo.

How to Enter: Send us your witty caption(s) for this photo from Convention archives. If the judges vote yours as one of the top three (and you have not been a previous winner), **we'll send you a ΤΒΠ t-shirt of your choice!**

Submit your entry using this form: *www.tbp.org/?CaptionSub* or mail to *The Bent* of Tau Beta Pi, Caption Contest, P.O. Box 2697, Knoxville, TN 37901-2697.

DEADLINE: THURSDAY, FEBRUARY 1, 2024 5 P.M. [ET]

Questions? Contact *p.mcdaniel@tbp.org*

WINNERS of the Fall 2023 "Caption This Photo" Contest:

We received 71 captions from 38 members for this contest commemorating the musical talents of the late Roger Hawks and John Luchini. You can read all entries, including captions and results from recent contests, at ***tbp.org/pubs/captionContest.cfm***.

1ST PLACE:

"I'll ask nicely one more time for you to give my guitar back."

David W. Kortebein, *IL A '85*

2ND PLACE:

"Play that one about the engineer, you know, Casey Jones."

Thomas W. Delong, *PA A '69*

3RD PLACE:

"Excuse me, can I borrow your suspenders? I seem to have forgotten my guitar strap."

Keith S. Koller, *PA B '81*

4TH PLACE:

"No, your plan to sing your presentation won't strike the right chord with the audience."

Eugene T. Camponeschi Jr., *VA B '78*

▲ The Fall 2023 contest image (above) was taken at the 1997 Convention in Minneapolis, MN. Assistant Secretary-Treasurer Roger E. Hawks, *NY L '75*, and John R. Luchini, Ph.D., P.E., *MI G '71*, hum a few bars before their next meeting.

CONGRATULATIONS TO OUR WINNERS!

THE ANNUAL REPORT OF THE

PRESIDENT

ADDRESSING CONVENTION: STATE OF THE ASSOCIATION

RACHEL K. ALEXANDER, P.E., *California Upsilon '15*
2023 President of the Association.

The Tau Beta Pi Association is governed by the Convention and the Executive Council (EC). These two bodies control all matters and affairs pertaining to the Association as a whole. The EC is comprised of nine elected alumni and the Executive Director. The EC has multiple responsibilities that are outlined in the provisions of our Constitution and Bylaws. The work of the Association is performed by the Headquarters staff under the leadership of Executive Director Curtis D. Gomulinski, and by alumni volunteers who serve as Advisors, District Directors, Engineering Futures Facilitators (EF), and members of Boards, Committees, and Task Forces. Thank you to everyone for your continued efforts. At Convention, the EC reports our activities during the preceding year with a State of the Association address and is subsequently published in *The Bent* magazine. As Council Chair and President of the Association, I present this report on behalf of the Executive Council.

STRATEGIC PLANNING

At our January retreat, the EC created **Figure A** to define how our Strategic Priorities interact. The purpose of the Strategic Plan is to give the Association direction for achievable, measurable goals over 3-5 years that improve and enhance our identity, chapter support, operations, and strengthen our financial health. **Financial Development,** shown at the bottom of the image, indicates that strong finances support our Association **Operations** to provide resources for our **Chapters** and **Alumni/Volunteers.** Strong and healthy chapters, both collegiate and alumni, create a great **membership experience** for members that encourages them to stay involved. The membership experience, Scholarships & Fellowships, the EF Program, networking with alumni, and more, can be what defines our inward and outward facing **Identity.** The EC defined goals for the Membership, Finance, and Operations portions of our Strategic Planning Bent and asked for feedback from the Convention on Identity. A well-defined identity creates the message for people to join ΤΒΠ and continue to support the Association.

Figure A *Strategic Planning Bent*

YEAR IN REVIEW

The Association is comprised of 255 active collegiate chapters and 50 active alumni chapters, organized into 16 Districts. Overall, our chapters initiated 7,289 members between August 2022 and July 2023. Since the start of the fall semester in August 2023, 26 new members were initiated. The Association has a total 633,018 members. Six members resigned and none were expelled. Four new chapters, approved at the 2022 Convention, were installed: the Georgia Delta Chapter at University of Georgia, the Massachusetts Kappa Chapter at Merrimack College, the North Carolina Eta Chapter at Western Carolina University, and the Tennessee Eta Chapter at Lipscomb University. Two new provisional alumni chapters are operating: Southwest Florida and Charlotte, NC. The 2023 Convention approved petitions for two new international chapters that will be installed in the coming months: The American University of Sharjah and Texas A&M University at Qatar.

The President's Report continues on page 38.

Newly Elected Executive Councillors

The 2023 Convention delegates elected three new members to the Executive Council from a field of four candidates to fill the seats of three members whose terms expire on December 31, 2023: Michael L. Peterson, *IA A '89*; George Youssef, *NJ G '01*; and Menna M. Youssef, Ph.D., *VA G '04*. The new Councillors will serve the 2024-26 term and join six members elected in 2021, 2022, and 2023. The Executive Council comprises nine Tau Beta Pi alumni who serve staggered terms of three years.

COLLEEN HILL-STRAMSAK

P.E. MICHIGAN EPSILON '00

Colleen recently joined the Macomb (MI) County Department of Roads as a traffic safety engineer, after spending the past 20+ years working for Hubbell, Roth & Clark as a department manager and associate.

Colleen has a B.S. in civil eng'g and an M.S. in transportation eng'g, both from Wayne State University, where she served in many officer positions, including chapter president. She is currently a MI E Chapter Advisor (since 2003) and secretary and past president of the ΤΒΠ Southeastern Michigan Alumni Chapter.

She has served on the International Board of Direction for the Institute of Transportation Engineers, 2012-14, and mentors women interested in the transportation industry.

HENRY H. HOUH Ph.D.

MASSACHUSETTS BETA '89

Henry currently works independently as a technology consultant and a technical expert witness, having previously assumed key roles in various venture-backed startups, including chief technologist and CTO.

He holds four degrees from the Massachusetts Institute of Technology: a B.S. in electrical engineering & computer science; a B.S. in physics; and master's and Ph.D. degrees in electrical engineering & computer science.

Henry served as an advisor to the MA Beta Chapter from 2003-16 and is a ΤΒΠ Laureate (1989).

THOMAS A. PINKHAM IV

MASSACHUSETTS EPSILON '88

Tom is currently the strategic accounts program manager for Kodak Moments, where he oversees product delivery and operations, supporting and retaining customer's accounts for over $100M in annual revenue in Europe.

He earned a B.S. in electrical engineering from Northeastern University and attended IMD Business School in Lausanne, Switzerland, as part of an Executive Development program.

Tom has served as a ΤΒΠ District 2 Director (NY & NJ) since 1990, enjoys developing chapter and Association leaders, and has advised nearly every Convention committee.

Members of the 2024 Executive Council include:

- Rachel K. Alexander, P.E., *California Upsilon '15*
- Michael J. Hand III, *Michigan Gamma '11*
- Ronald M. Hickling, *California Epsilon '80*
- Colleen L. Hill-Stramsak, P.E., *Michigan Epsilon '00* **newly elected**
- Henry H. Houh, Ph.D., *Massachusetts Beta '89* **newly elected**
- MingDe Lin, Ph.D., *New York Gamma '01*
- Marla A. Peterson, *Arizona Alpha '83*
- Thomas A. Pinkham IV, *Massachusetts Epsilon '88* **newly elected**
- Joan M. Sciacca, *California Mu '87*

Our thanks to the fourth candidate, Russell W. Pierce, *Washington Alpha '70*, who was not elected.

The new Executive Council have met and elected officers for the upcoming year from among the Council members and will serve for a period of one year. After serving as vice president for one year, the vice president automatically becomes president the following year. The officers for 2024 include: • President Ron Hickling • Vice President Marla Peterson • Secretary Henry Houh & • Treasurer Mike Hand. Executive Director Curtis D. Gomulinski serves as a non-voting member of the Council.

Tom Pinkham speaks to the 2023 Convention attendees.

2023 TAU BETA PI CONVENTION

SUMMARY OF ACTIVITIES AND BUSINESS FROM THE 2023 CONVENTION

The 117th Convention of Tau Beta Pi was held October 12-14, 2023, in Atlanta, GA, marking the first time a TBΠ Convention was held in Georgia. There were 424 members representing 207 collegiate chapters and 28 alumni chapters on behalf of the entire organization. The total included 302 students, 109 alumni, plus 13 chapter advisors. An additional 28 non-member guests, volunteers, and consultants participated in Convention activities.

The Georgia Alpha Chapter at the Georgia Institute of Technology and the Atlanta Alumni Chapter hosted the Society's annual meeting. **Hannah G. West,** *GA A '24*, served as Arrangements Chair.

Headquarters for this Convention was the Courtland Grand Hotel. Five Business Meetings, Committee and District meetings, Professional Development and NICE Sessions, and a Model Initiation were held at the hotel. The Convention group photo took place at Centennial Olympic Park (above), Atlanta's lasting legacy of the 1996 Olympic Games.

Missing from this year's Convention, the first time in 20 years, was an in-person corporate and graduate program Recruiting Fair. A smaller virtual Recruiting Fair was offered on October 4-5. The list of all recruiters appears on **page 15.** The Association treated the students to a game night social on Wednesday evening.

At the First Business Meeting on Thursday, the President's Report on behalf of the Executive Council was presented by **President Rachel K. Alexander, P.E.**, *CA U '15*, (**page 12**). Reports of the Directors of the Association, networking and Convention orientation activities at the meeting were followed by Committee, District, and NICE meetings.

The evening's banquet honored the 2023 Laureates and included welcome messages from **Raheem A. Beyah, Ph.D.**, *NC E '98*, Dean of Georgia Tech's College of Engineering and **Laurence J. Jacobs, Ph.D.**, *GA A '79*, Senior Vice Provost & professor at Georgia Tech. **Ron M. Hickling,** TBΠ Vice President, introduced the keynote speaker for the evening, **Dennis D. Truax, Ph.D., P.E.**, *MS A '78*, past President of the American Society of Civil Engineers.

Friday's Chapter Recognition Luncheon included the presentation of the 2023 Chapter Excellence Awards to 36 chapters (**page 18**), the Report of the Executive Director, and the Chapter Project Awards (**page 20**).

The Friday Alumni Recognition Banquet included presentations of the 2023 McDonald Mentor, Outstanding Advisor, and Distinguished Alumni.

President Alexander led the recognition of TBΠ Advisors and George Youssef, Executive Councillor, presented service anniversary certificates to three HQ staff.

The Chapter Awards Banquet on Saturday brought Convention business to a close with an abundance of activities. The Final Business Meeting was held as well as recognition of the winners of the J.D. Froula Most Improved Membership Awards (**page 19**), the R.H. Nagel Most Improved Chapter Awards (**page 19**), and the R.C. Matthews Outstanding Chapter Awards (**page 18**). Director of Alumni Affairs Tricia E. Gomulinski presented the inaugural 2023 Alumni Chapter Awards (**page 42**). Following the Resolutions Committee presentation, Executive Council service as well as the new Executive Councillors were recognized. The Convention was adjourned with a napkin chain as well as a rousing rendition of the Tau Beta Pi yell, led by Jim Froula, Executive Director Emeritus.

TAU BETA PI LAUREATES

At Thursday's Laureate Banquet, Executive Councillor **Marla A. Peterson** introduced the 2023 Laureates: **Maxine M. Dupuis**, *NY N '23*, for athletic achievements; **Alexander J. Francisco**, *NY N '24*, for achievements in the arts; **Gwyneth M. Schloer**, *VA B '22*, for diverse achievements; and **Mitchell Sueker**, *SD A '23,* for athletic achievements. Each Laureate received a commemorative plaque and $2,500 check.

TAU BETA PI-MCDONALD MENTOR

Richard J. Spontak, Ph.D., *PA B '83*, was honored with the 2023 McDonald Mentor Award at the Alumni Recognition Banquet. Executive Councillor **Marla A. Peterson** presented him with a $1,000 check, a bronze engraved medallion, and a replica lapel pin. Another $1,000 will be presented to the nominating chapter, the Research Triangle Alumni Chapter in North Carolina.

OUTSTANDING ADVISOR

Andrew E. Toy, *MI I '95*, was recognized as the 2023 Outstanding Advisor at the Alumni Recognition Banquet, Treasurer **Michael J. Hand III** presented him with $1,000 and another $1,000 for the university's discretionary fund.

DISTINGUISHED ALUMNUS

Three Distinguished Alumni were recognized at the Alumni Recognition banquet; **Edward D. Basta**, *OH E '82*, **Brendan J. Chan, Ph.D.**, *MI B '03*, and **H. Alan Mantooth, Ph.D., P.E.**, *AR A '85*, is the Asad M. Madni Distinguished Alumnus. Councillor **Menna Youssef, Ph.D,** presented each with an engraved plaque and a $2,000 scholarship in each winner's name was awarded to TBΠ students for the 2022-23 academic year.

CHAPTER & PROFESSIONAL DEVELOPMENT

The Chapter Development Program included National Interactive Chapter Exchanges (NICE) and district meetings. Each district met three times during Convention and NICE Sessions were offered on Thursday and Friday. A Professional Development Program presented twelve topics in career development and leadership: • Graduate Fellowships • How to Motivate, Teach, Coach and Influence Both Yourself and Others • Where Has the Time Gone? • The Academic Career Path • Do I Need a P.E. License? • How to Leverage Professional Development Opportunities for your Chapter • Entering the Workforce: A How-to-Guide on Navigating Life After School • New Engineering Solutions for Tomorrow (NEST) • Leading the Change: Equity and Inclusion • Climbing the Corporate Ladder • Maximize Your Career Potential with Working Genius • and • Intellectual Property and Career Opportunities.

2024-26 EXECUTIVE COUNCILLORS ELECTED

Three candidates, introduced in the Fall 2023 issue of *The Bent*, plus an additional candidate nominated at Convention, ran for the opportunity to serve on the Executive Council. The Convention elected three members to serve the 2024-26 term. Results are reported on **page 13**.

A SPECIAL THANKS TO OUR RECRUITERS

We gratefully acknowledge the 2023 Virtual Recruiting Fair participants:

FEATURED RECRUITERS

American Tower Corporation
BAE Systems
Dartmouth Engineering
The George Washington University
University of Michigan Engineering
University of Michigan Electrical & Computer Engineering
Michigan State University
Michigan Tech
MIT LGO
New Jersey Department of Transportation
Northeastern University
Northwestern Engineering
Northwestern Pritzker School of Law
The Ohio State University
Penn Engineering
Pepsico Beverages
Pitt Swanson Engineering
PPI | Kaplan
Purdue University
Rensselaer Polytechnic University
Siemens
Stevens Institute of Technology
UT Oak Ridge Innovation Institute
Virginia Commonwealth University

BASIC RECRUITERS

Columbia Engineering
Honeywell
Intelsat
Kutta
Penn State
South Dakota School of Mines
USC Viterbi School of Engineering
Technip Energies
UVA Engineering
Vanderbilt University
Worcester Polytechnic University

SEE MORE 2023 CONVENTION IMAGES

Available at:
www.tbp.org/?Images24

COMMITTEES

Convention business was handled by 13 standing and *ad hoc* committees with collegiate and alumni chapter voting delegates serving on one of the following committees: **Advisors**; **Alumni Chapters**; **Awards**; **Chapter & Association Financial Affairs**; **Constitution and Bylaws**; **Convention Site**; **Diversity, Equity & Inclusion** (DEI); **Image and Marketing**; **New Engineering Solutions for Tomorrow** (NEST); **Petitions**; **Program Review**; **Resolutions**; and **Rituals**.

CONSTITUTION AND BYLAWS

The Committee was charged with reviewing 18 policies developed by the Executive Council following the general revision to the Tau Beta Pi Constitution and Bylaws. Of those reviewed, the Committee recommended no changes to seven of the policies. Changes were suggested to the Executive Council for five policies: Compilation of Eligible Candidate Data, Chapter Membership Reports, Retiring Chapter Officers, New Chapter Petitions, and Executive Director Responsibilities. Three policies were voided due to containing repetitive or unnecessary language: Chapter Committees, Chapter Officer Duties, and Chapter Fines. After much debate, the Convention adopted changes to two policies: Executive Council Responsibilities and Convention Agenda and Minutes. The Chapter Fees policy was referred to the 2024 Convention for further consideration.

NEW CHAPTERS GRANTED

The Petitions Committee considered two petitions for new international TBΠ chapters and the Convention voted to grant charters to Qatar Alpha (QAT A) at Texas A&M University at Qatar and United Arab Emirates Alpha (UAE A) at The American University of Sharjah. The chapters will be installed sometime in March, 2024, raising the number of active chapters to 257. District assignments for the new chapters will be determined by the Executive Council.

FINANCIAL AFFAIRS

The committee was tasked to review delegate expenses for the 2023 Convention, chapter accounts receivable to HQ, the Auditor's report for 2019-21, a Convention policy to streamline initiation fees, reimbursement actions of the 2022 Convention, and a proposal to move permitted investment options from the Constitution to Convention policy. No unusual voting delegate expenses were found for the 2023 Convention and six of the eight chapters with balances over $500 were contacted. The 2019-21 auditors report was accepted. A motion setting Association initiation fees and outlining procedures to establish future costs and make changes passed. A proposal to update the Convention reimbursement policy for delegates from collegiate and alumni chapters passed. The Committee presented a proposed Constitution change to the allowable investment options which would move the options to a new Bylaw IV, so changes to the investment options could be made without ratification by the chapters; the motion failed to receive the 3/4 favorable vote necessary to amend the Constitution. A motion requiring the Executive Council to make all information sheets for committee charges available to chapters at least 60 days in advance of Convention was adopted.

RESOLUTIONS

Charged with discussing the Identity of Tau Beta Pi and recommending a five-year action goal, the Committee recommended that the EC create a survey asking for a one-sentence definition of the identity of TBΠ and disseminate it to a diverse range of stakeholders, members, and eligible candidates who did not accept membership. During Saturdays' Third Business Meeting, the committee presented a video of a humorous Convention recap skit which can be viewed on TBΠ's YouTube Channel. Reference to the Committee's Final Report to the Convention appears at the end of this article.

RITUALS

The Rituals Committee reviewed three proposals to modify language in the Ritual. All motions to amend the ritual script were approved.

The committee organized the Model Initiation ceremony which included 29 initiates from Georgia Alpha, 28 undergraduates and one graduate student.

Above: Hannah G. West, *GA A '24*, 2023 Convention Arrangements Chair, welcomes attendees to Atlanta, Georgia.

Right: Executive Director Emeritus James D. Froula, P.E. (ret.), leads the final Convention banquet in the Tau Beta Pi Yell.

CHAPTER AWARDS

The Chapter Awards Committee announced OH Kappa at the University of Akron as the R.C. Matthews Outstanding Chapter for 2022-23, the highest honor for a collegiate chapter in Tau Beta Pi. An honorable mention was presented to WI Alpha. The R.H. Nagel Most Improved Chapter for 2022-23 went to NY Tau at Binghamton University. The J.D. Froula Most Improved Membership Award for 2022-23 was presented to CA Nu at the California State Polytechnic University- Pomona. Honorable mentions for Most Improved Membership went to FL Eta and LA Gamma.

FUTURE CONVENTION

The Convention Site Committee reviewed information from Little Rock, AR; Mobile, AL; San Diego, CA; Seattle WA; St. Louis, MO; and Tucson, AZ. After elimination of four sites and hearing presentations from the chapters at San Diego and Tucson, the proposal to host the 2026 Convention in Tucson, AZ, was accepted.

OTHER BUSINESS

The *ad hoc* **Alumni Chapters Committee** was assigned to review and recommend changes to the operations and activities of alumni chapters and develop an "elevator pitch" to appeal to potential alumni chapter members. A list of recommendations for improvement of Alumni Chapter operations was developed and three videos of elevator skits were created and can be viewed here: *https://youtu.be/yDNoYPltryI*.

The *ad hoc* **Diversity, Equity & Inclusion Committee** reviewed ten charges for potential DEI work and for future projects. Recommendations were made pertaining to the Eminent Engineer initiation process, the Chapter petitioning process, the affinity group framework, providing new resources on the DEI website, increasing inclusivity of initiation, and increase HSI/HBCU Outreach. A motion made for the standing DEI Committee to review the recommended actions and report back quarterly for amending the Eminent Engineer initiation process, maintaining internal affinity groups, and increasing HSI/HBCU outreach was approved as presented. The motion to update TBΠ's Code of Ethics was adopted without opposition.

The three 2023 Distinguished Alumni awardees with their plaques: (left to right) Edward Basta, *OH E '82*; H. Alan Mantooth, *AR A '85* & Brendan Chan, *MI B '03*.

The *ad hoc* **New Engineering Solutions for Tomorrow Committee** was charged with reviewing available NEST materials and providing general improvement recommendations to the NEST program developers, grade deliverables, and provide a theme for the 2023-24 competition. Materials were reviewed,and final report submissions were graded; the final winner, CA AA's project: "Knees to Fit Needs," was announced Saturday evening. Regarding NEST challenge topics, the team moved to make waste management the 2023-24 NEST theme, which was seconded by MI G. The motion passed.

Charged with identifying why people join TBΠ, the *ad hoc* **Advisors Committee** reported five reasons. The committee also worked on the definition of TBΠ's "Identity," creating three taglines and recommended the committee meet at the 2024 Convention to advance this discussion.

The *ad hoc* **Program Review Committee** was charged with reviewing and recommending action on the following appeals which were approved: Computer Science at CA AA; four appeals from MI Epsilon (BS in Computer Science and MS in Robotics with a Major in Smart Mobility; Robotics with a Major in Intelligent Control; and Environmental and Sustainability Engineering), Computer Science from WA Beta; and Computer Science from the American University of Sharjah.

The *ad hoc* **Image and Marketing Committee** discussed communications channels available on campuses to communicate and increase TBΠ's visibility, reviewed progress on the new Members Website and recommended additions, and reviewed graduation stoles and honor cords. A motion for TBΠ to design and offer an additional stole as part of the graduation regalia collection passed. A motion passed directing the EC to appoint an *ad hoc* Public Relations Committee for the 2024 Convention consisting of Image, Marketing, Social Media, and Website charges.

The **Resolutions Committee** thanked the host chapter members, officials, generous alumni, recruiters, award winners, HQ staff, volunteers, and others for the many positive things that took place during the year. The Chair of the Resolutions Committee concluded his remarks to Convention with inspirational messages for chapter leaders to take back to their chapters.

Chapter Awards

Ohio Kappa Chapter president Lily M. Coss (left) and Recording Secretary Hailey N. Zackiewicz with the R.C. Matthews Award.

OUTSTANDING CHAPTER AWARD:

Ohio Kappa

The Ohio Kappa Chapter at the University of Akron received the 2022-23 R.C. Matthews Outstanding Chapter Award. Installed in 1974, this is the chapter's first ever top TBΠ chapter recognition, after receiving an honorable mention last year.

The 1956 Convention established the Outstanding Chapter Award to encourage and recognize high-grade work in both routine and special affairs. It is based on how well chapter service projects fulfill the objectives of Tau Beta Pi and on the quality and promptness of reports to Headquarters.

The Convention Awards Committee recognized the exemplary service projects and community impact of OH Kappa and its members. It was also remarked that the chapter had impressed the student delegates with its outreach and volunteer events, including consistently participating in Make a Difference Day volunteerism, collecting donations for Haven of Rest Ministries, and organizing K-12 outreach programs.

OHIO KAPPA CHAPTER LEADERS (2022-23):

President – **Nadine J. Salem, *OH K '23***
Vice President – **Samuel A. Mysza, *OH K '23***
Treasurer – **Jacob B. Wise, *OH K '23***
Recording Secretary – **Emily M. Green, *OH K '23***
Corresponding Secretary – **Abigail J. Jones, *OH K '23***

OHIO KAPPA CHAPTER ADVISORS (2022-23):

Teresa J. Cutright, Ph.D., *OH K '92* (*Chief*)
Robert S. Lillard, Ph.D., *OH K '90*
Yilmaz Sozer, Ph.D., *OH K '00*
Marnie M. Saunders, Ph.D., *OH K '98*

HONORABLE MENTION — Outstanding Chapter Award
Wisconsin Alpha (University of Wisconsin-Madison)

Chapter Excellence Awards 2022-23

Executive Director Curt Gomulinski recognized these chapters to mark excellence in their performance in seven areas. Chapters with distinction, scoring 100 percent or more, are in bold:

Alabama Alpha	**New York Alpha**
Alabama Delta	**New York Omicron**
Alabama Epsilon	**New York Tau**
California Epsilon	North Carolina Alpha
California Lambda	**Ohio Alpha**
California Psi	**Ohio Beta**
Florida Alpha	Ohio Gamma
Florida Delta	**Ohio Iota**
Georgia Beta	**Ohio Kappa**
Illinois Alpha	**Ohio Lambda**
Indiana Alpha	**Ohio Nu**
Iowa Alpha	Oklahoma Alpha
Louisiana Beta	**Oregon Alpha**
Massachusetts Kappa	**South Dakota Alpha**
Michigan Epsilon	**Tennessee Alpha**
Michigan Iota	**Texas Alpha**
Mississippi Beta	Texas Nu
Missouri Gamma	**Wisconsin Alpha**

Tau Beta Pi
The Engineering Honor Society

2023 Convention

Awards Committee Chair August B. Phelps, *MD D '25* (left) with NY Tau Chapter president Deanna J. Mazzamuto.

Jim Froula congratulates Austin Roberts, *FL H '24,* for his chapter's J.D. Froula Award honorable mention.

MOST IMPROVED CHAPTER AWARD:

New York Tau

The New York Tau Chapter at Binghamton University received the 2022-23 R.H. Nagel Most Improved Chapter Award.

The 1971 Convention established this award to recognize major improvement in chapter development, including project work and reports to HQ, in one year as compared with previous years.

The chapter hosted the District 2 Conference for 17+ ΤΒΠ chapters from New York and New Jersey. It also organized 22 other chapter projects ranging from Engineering Futures to community service activities, with food rescue and the Humane Society, and an executive board transition dinner. The variety of these events demonstrated NY Tau's commitment and focus to bringing Tau Bates together, making a difference in the local community, and better preparing its members for a career in engineering.

NEW YORK TAU CHAPTER LEADERS (2022-23):

President – **Christina M. Coulton, *NY T '23***

Vice President – **Nicholas C. Van Deusen, *NY T '23***

Treasurer – **Emily E. Reitz, *NY T '23***

Recording Secretary – **Gianna Paier, *NY T '23***

NEW YORK TAU CHAPTER ADVISOR (2022-23):

Colin B. Selleck, *LA A '78 (Chief)*

HONORABLE MENTION — None

MOST IMPROVED MEMBERSHIP AWARD:

California Nu

The California Nu Chapter at California State Polytechnic University, Pomona, was selected as the 2022-23 J.D. Froula Most Improved Membership Award recipient.

In 2011, the Executive Council established an annual Most Improved Membership Award to recognize chapters for increased membership over a three-year period. Named in honor of James D. Froula, P.E. (ret.), TN A '67, only the third person to hold the position of ΤΒΠ *Secretary-Treasurer*.

The California Nu Chapter had very strong numbers across all three award criteria: improved membership, percent increase of new members, and ratio of initiates to candidates. Specifically, the Awards Committee commended the chapter for having one of the highest growth rates for 2022-23 and an impressive jump in the ratio of eligible members that were initiated.

CALIFORNIA NU CHAPTER LEADERS (2022-23):

President – **Missael A. Cuevaschavez, *CA N '23***

Treasurer – **Kristen P. Jingco, *CA N '23***

Recording Secretary – **Justin M. Wong Lara, *CA N '23***

CALIFORNIA NU CHAPTER ADVISORS (2022-23):

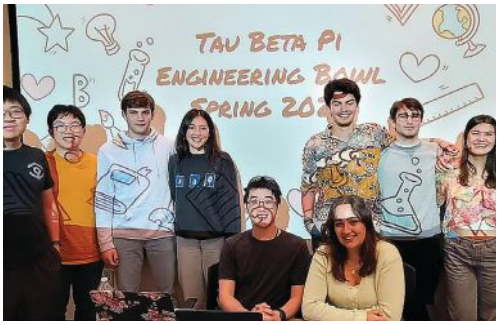
Colin B. Danahy, *CA N '16*

Man-Chu Yeung, *CA A '86*

HONORABLE MENTIONS — Most Improved Membership Award: **Florida Eta** (FL A&M Univ.-FL State Univ.) and **Louisiana Gamma** (Louisiana Tech University)

Chapter ⋆ Project Awards

Alabama Epsilon members sporting their TBΠ polos.



California Epsilon hosts the annual Spring Engineering Bowl competition.

Florida Delta electees polishing the campus Bent monument.

AL Ε University of South Alabama
44 Projects Hosted the 7th annual Leadership Workshop for those on campus interested in improving their leadership skills. Served as tour guides and assisted with demonstrations for EWeek Open House.

CA Ε Univ. of California Los Angeles
80 Projects Focused on engineering community involvement with free drop-in tutoring offered each academic quarter and hosted events such as Engineering Bowl, a trivia related competition and social.

FL Α University of Florida
54 Projects Held unique electee events such as karaoke and volleyball to improve membership camaraderie and ran community outreach GatorTRAX Saturday sessions to increase K-12 interest in engineering.

FL Δ University of Central Florida
52 Projects Adopted a road on campus and held more than seven activity sessions to keep it clean. Conducted 15+ Bent monument polishing events and hosted a Knight's Pantry drive to collect items for the campus pantry.

FL Η FL A&M Univ.-FL State Univ.
34 Projects Hosted several general body meetings that included professional development workshops. Participated in College of Engineering Involvement Fairs each semester to increase TBΠ awareness on campus.

IA Α Iowa State University
101 Projects Continued annual activities such as the Engineer's Ball, jointly sponsored with the Engineering Student Council, the Roller Coaster Competition for middle and high schoolers, and Senior Sendoff.

MI Γ University of Michigan
150 Projects Focused on a return to in-person events with the TBP/SWE Career Fair, with 350 companies in attendance, and MindSET K-12 hands-on activity sessions such as a boat maker module.

MI Ε Wayne State University
39 Projects Held MindSET sessions with Emerson Elementary-Middle School and co-hosted with the Biomedical Engineering Society an Engineering Network Mixer including TBΠ alumni and industry professionals.

MI Ι Univ. of Michigan-Dearborn
18 Projects Presented four "Kasravi Talks" with engineering professor **Kas Kasravi, Ph.D.,** *MI D '82*. Hosted an exam encouragement social event before finals with refreshments, treats, music, and study support.

NY Ν University at Buffalo
22 Projects Organized a time capsule event in conjunction with the 76th anniversary of the school of engineering. Volunteered at the Buffalo Science Olympiad Regional Competition as graders and with event setup.

$3,500 in Scholarships will be awarded to seven chapters that received Chapter Project Awards for at least three consecutive years. Each chapter will receive $500.

Alabama Epsilon
Iowa Alpha
Michigan Gamma
Ohio Kappa
Tennessee Alpha
Texas Alpha
Wisconsin Alpha

At the 2023 Convention, 20 chapters were recognized with **Chapter Project Awards** for outstanding performances during 2022-23.

NY Ο SUNY at Stony Brook
24 Projects Implemented a digital ΤΒΠ Newsletter for members and the engineering community. Hosted three Tau Talk sessions to showcase highlights of a professor's research and work.

NY Τ Binghamton University
23 Projects Helped sort food for the Thanksgiving Food Rescue Community Service event. Gathered on *TBPi Day* for pizza pies and played Blooket on ΤΒΠ/Pi Day trivia with the winner receiving a t-shirt.

OH Ι Ohio Northern University
24 Projects Hosted 27 weekly tutoring sessions for underclassmen, a graduate school info session with **Lauren Logan Ph.D.,** *OH D '10*, and a resume review/career fair prep night with the Office of Careers and SWE.

OH Κ University of Akron
71 Projects Gave engineering education presentations to high school students throughout NE Ohio and W. Pennsylvania. Hosted an alumni professional development session with **Chris Ferguson,** *OH K '21*.

OK Α University of Oklahoma
27 Projects Hosted therapy dogs and an alpaca in the engineering quad to help students relieve stress. Organized an activity where students write Valentines for loved ones and donated cards to local hospitals.

SC Α Clemson University
21 Projects Hosts an annual Major Discovery Night, an exploration event for 1st-year engineering students. Raised $400, collected 76 cans of food, and donated them to the Clemson Community Cares charity.

TN Α Univ. of Tennessee
15 Projects Co-hosted the in-person 2022 Convention in Knoxville and continued the annual Pi(e) Your Professor fundraiser on *TBPi Day* with proceeds going to the Ronald McDonald House.

TX Α University of Texas at Austin
116 Projects Participated in Austin's adopt-a-creek by cleaning a section of shoal creek 4 times. Hosted numerous social events such as bowling, game nights, kayaking, and Fireside chats with UT professors.

TX Ν Univ. of Texas Rio Grande Valley
30 Projects Members were chosen to present three times at outreach events for high schoolers to promote engineering, internships, and research experience. Volunteered at the UTRGV STEM Manufacturing Expo.

WI Α Univ. of Wisconsin-Madison
86 Projects Partnered with other engineering organizations on campus to staff concession stands for the UW Men's Hockey games, earning essential chapter funds. Virtually volunteered through Zooniverse.

Winners of the Ohio Kappa Best Bent Competition (from crafted materials).

Oklahoma Alpha Chapter booth for Valentines' cards called "Palentines."

Cans of food collected for the Thanksgiving fundraiser by South Carolina Alpha Chapter.

Texas Nu volunteers after the STEM Manufacturing Expo & Exhibition to promote interest in manufacturing innovation.

Texas Alpha members at the Burger Burn fundraiser event.

THIS IS THE FOURTEENTH IN A SERIES OF ARTICLES THAT INVESTIGATES THE HISTORY OF SCIENCE AND ENGINEERING.

One way in which this history has been preserved is in the names of the scientific units that we commonly use. Those units will serve as starting points for these articles as we explore "Why do we call it a...?"

By: ***Lyle D. Feisel****, Ph.D., P.E. (ret.), Iowa Alpha '61*

WHY DO WE CALL IT A...

GAUSS

Some of our physical units are better known than others. For instance, almost everyone has heard of a volt. A curie? Not so much. The unit that is the subject of this column falls pretty far out on the "lesser known" end of the spectrum. It is a unit of magnetism in the centimeter-gram-second (CGS) system which is used by only a small percentage of scientists and engineers. However, the person for whom the unit is named is, as we shall see, also memorialized in other ways.

The gauss (abbreviation G) is the CGS unit of magnetic flux density. In this system, magnetic flux is measured in maxwells (preview of a coming attraction) and one gauss is defined as one maxwell per square centimeter.

The gauss is named in honor of Carl Friedrich Gauss, a mathematician and scientist of considerable renown.

Gauss, an only child, was born on April 30, 1777 — a year after the birth of the United States — in the city of Brunswick. The city, which is also known as Braunschweig, was in the duchy of Brunswick that later became a part of the German Empire. The family was poor; Carl's father was uneducated, as was his mother, and earned a living in a variety of trades and odd jobs.

At the age of seven, Carl was enrolled in St. Katherine's Public School, which, I presume, did not charge tuition. He was quickly recognized as having an exceptional intellect, particularly in mathematics. He could calculate faster than his teacher and soon mastered advanced topics in arithmetic. His teacher pressed Carl's father to allow the boy to continue his education and his father agreed, although the family had no wherewithal to fund attendance at a higher school. Fortunately, Gauss's brilliance came to the attention of the Duke of Brunswick who agreed to fund the boy's further education. In 1787, at the age of 11, he enrolled in the Martino-Katharineum grammar school, which still exists today. Again, he excelled as a student, particularly in mathematics and languages.

With continued funding from the Duke of Brunswick, Gauss enrolled in Caroline College, receiving an undergraduate degree in mathematics at the age of 18. From there, he proceeded to the University of Göttingen where he studied for three years. At the behest of the Duke of

Brunswick, he received his doctorate in 1799, not from Göttingen, but from the University of Helmstedt. The duke continued to be impressed by Gauss's work and maintained his financial support so Gauss could work as a private scientist. Unfortunately, this arrangement came to an end in 1806 when the duke was killed during a battle in one of the Napoleonic wars. Apparently, there was no system of succession, and, in short order, the duchy was abolished, as was Gauss's financial support.

Fortunately, Gauss was so well known and so highly respected that he was soon offered a position as director of the astronomical observatory at the University of Göttingen. He stayed at Göttingen for the rest of his life, continuing to make great contributions in mathematics, astronomy, physics, and, indeed, engineering. He invented and developed various devices used in surveying and astronomy.

It would be impossible, with the few words remaining in this essay, to list all of Gauss's contributions in mathematics, but there are a few that stand out. Perhaps his favorite was the construction of the heptadecagon, a seventeen-sided polygon, using only a compass and a straightedge. This problem had been a challenge to mathematicians since the days of the ancient Greeks. He was so proud of this that he wanted the figure inscribed on his tombstone. Perhaps his most significant work was his book, published in 1801 when he was 24 years old, *Disquisitions Arithmeticae* (Investigations in Arithmetic), which forms the basis of number theory.

As director of the astronomical laboratory, Gauss applied his mathematical skills to solve some real astronomical problems. In 1801, an Italian astronomer, Giuseppe Piazzi, observed a new heavenly body that changed its position from day to day. Thinking he had discovered a comet, Piazzi tracked the body for some three degrees of its orbit until it was lost behind the sun. Piazzi and others attempted to predict the time and position when it should reappear, but their mathematics were not sufficient to make an accurate prediction.

Gauss, recognizing the inadequacy of the existing methods, developed a new mathematical technique that provided very accurate results based on very sparse data. His prediction proved to be correct and the body, now known as Ceres, an asteroid or minor planet, was observed right on schedule. Gauss went on to make many further contributions to the field of astronomy.

Gauss became interested in electricity and magnetism and teamed up with a younger friend, Wilhelm Weber, to develop both theory and applications in the field. Their work describing the earth's magnetic field led to the further development of magnetic units of measurement and contributed to the development of the CGS system. The two scientists became engineers for awhile and invented what some consider the first practical telegraph system. It was about 2.5 km long and connected their two laboratories.

Gauss is the subject of this article because a physical unit has been named for him, but his name is remembered in other ways as well. For instance, there is the process of "degaussing." One of the first uses of that term referred to a process applied to Navy ships. A ship is basically a big chunk of steel configured in such a way that it floats. If that big chunk of steel spends a lot of time moving through the earth's magnetic field, as most ships do, it becomes a huge, albeit weak, permanent magnet. During World War II, the Germans developed a naval mine that was triggered by the detection of a magnetic field. To protect ships from these mines, ships were demagnetized using various techniques. In naval parlance, the ships were "degaussed." The term is now also used for the demagnetization of CRTs and magnetic computer media.

The name of Gauss is also remembered in the field of statistics. The Gaussian Distribution, popularly known as the bell curve or normal distribution, is used to describe, or at least approximate, the distribution of outcomes of various phenomena. Test scores, measurement errors, and biological parameters such as height, weight, and life span are variables that are often analyzed using the Gaussian Distribution.

Gauss led a rich family life. His first wife, Johanna, who was the mother of three children, died at the age of 29. Gauss remarried a few years later and three more children were born of this second marriage. Two of his sons emigrated to the United States in the 1830s and became successful businessmen.

Gauss died on February 23, 1855, at the age of 77. He is buried in Göttingen. The engraving on his tombstone does not include a heptadecagon; the stonemason concluded that with 17 sides, it would simply look like a circle. Gauss is widely regarded as the greatest mathematician of all time. He made enormous contributions to pure mathematics and to the application of mathematics to disciplines such as astronomy and surveying. He, along with his friend Wilhelm Weber, contributed to the understanding of electromagnetic phenomena. And that's why we call a gauss a gauss.

Invented in 1821 by Gauss, the heliotrope is an instrument that uses a mirror to reflect sunlight over great distances to mark the positions of participants in a land survey.

BRAIN TICKLERS

Results From Summer

Perfect Scores

Couillard, J. Gregory	IL	A	'89
Curran, Corey B.	NY	Ξ	'22
*Etz, Stephen P.	NJ	B	'90
Etz, Peter	Son of member		
Gaston, Charles A.	PA	B	'61
Golemme, Steven S.	IL	A	'20
*Griggs Jr., James L.	OH	A	'56
*Kuhn, Walter A.	OH	A	'81
McCullough, Charles R.	AL	B	'12
*Norris, Thomas G.	OK	A	'56
*Parks, Christopher J.	NY	Γ	'82
*Roediger, Robert R.	MO	Γ	'71
*Strong, Michael D.	PA	A	'84
*Thaller, David B.	MA	B	'93
Upshur, John I.	VA	A	'83
Van Dillen, David E.	NJ	B	'67
*Wilkinson, Timothy S.	WA	A	'84

Other

Bannister, Kenneth A.	PA	B	'82
Berthold, Kristopher D.	TX	B	'04
*Bertrand, Richard M.	WI	B	'73
Braña-Mulero, Francisco	PR	A	'74
Costantino, John T.	NJ	A	'79
*Gibbs, Kenneth P.	MO	Γ	'76
Gluck, Frederick G.	CO	B	'67
Grewal, Rashi	NJ	Γ	'09
Griffiths, Peter D.	GA	A	'82
Lalinsky, Mark A.	MI	Γ	'77
*Marek, Kenneth A.	TX	B	'06
Marrone, James D.	IN	A	'87
*McHenry, S. Dale	MO	B	'81
*Schwam, Susan E.	WA	A	'88
Schwam, Freely	Spouse of member		
Sensmeier, Mark D.	IN	A	'85
*Spong, Robert N.	UT	A	'58
*Spring, Gary S.	MA	Z	'82
Summerfield, Steven L.	MO	Γ	'85
Woodley, Isaiah J.	FL	Γ	'25

*Denotes correct bonus solution

Note from Spring grades

Spring answers from **Robert N. Spong,** *UT A '58*, did not arrive at ΤΒΠ HQ and, therefore, his name was omitted from the Fall 2023 issue "Results" section. We want to recognize that he has since submitted his answers digitally and they were all correct. We thought our readers might also enjoy a few biographical notes of interest: Robert is 87 years young, in his 22nd year of working BTs, and had a 41-year career in systems and electrical engineering, focused on large military radars.

Summer Review

As Summer solutions arrived, the judges realized that Problem 2 (What Lies Between) was stated ambiguously. While the judges intended to ask for a guess with the minimum average percentage error, numerous readers reasonably interpreted the wording as asking for a guess that minimizes the worst case percentage error. Our published Summer solutions gave the answer for the former, that is, **3√11**. However, we concluded that **9.9** was a correct response to the alternate interpretation of the problem and scored both as correct.

We received a higher number of correct Bonus answers than expected. The judges anticipated the problem to be extremely difficult, but a number of readers noticed that it was easy to narrow the possible solutions to two integers, and then simply guess one of them.

Problem 3 (Shining Light) was the most difficult regular problem; only 60% of respondents submitted a correct answer.

Fall Answers

1: 20 + 2149 + 48 + 402 + 198765 = 201384 is the solution to the cryptarithm WE + WANT + NO + NEW + ATOMIC = WEAPON. There must be a carry of 1 into column 6, so W = A + 1 and it must be that E = 0 and T = 9, and O + C4 (column 4 carry) must be 9, so O is either 7 or 8. A ≠ 7, so try A = 6 & W = 7. This implies O = 8, but both C = 1, N = 5, and C=2, N=6 have an impossibility in column 2. Try A = 5 & W = 6. If O = 8, then C=1, N = 4 gives I = 2 but has an impossibility in column 3 and C = 4, N = 7 has problems in column 2. If O = 7, then C = 1, N = 3 has problems in column 2 and C = 2, N = 4 gives I = 1 but an impossibility in column 3. Try A = 4 & W = 5. If O = 8, then C = 1, N = 3 has problems in column 2. If O = 7, then C = 1, N = 2 gives I = 6 but an impossibility in column 3, and C = 2, N = 3 has problems in column 2. Note that it is impossible for C4 to be more than 1 if A≤3 and W≤4, so O = 8. Try A = 4 & W = 5. C = 1, N = 2 and C = 5, N = 6, and C = 6, N = 7 all have impossibilities in column 2. Try A = 2 & W = 3, and immediately we see column 1 has an impossibility, so A = 1 & W = 2. C = 4, N = 3, and C = 6, N = 5 and C = 7, N = 6 all have impossibilities in column 2 so C = 5 and N = 4. This gives I = 6, and it follows that M = 7, and P = 3 to complete the solution.

2: The 30-digit solution for j is **296,892,618,846,717,316,677, 163,422,344.** The given equation can be written as a polynomial in j: $3j^2 + 3j + 1 - k^2 = 0$. For integer solutions, the discriminant must be a square, say l^2 which gives $3((2k)^2 - 1) = l^2$. It follows that l is a multiple of 3, say $3m$. (Note this implies that $j = m/2 - 1/2$). If we denote $x = 2k$ as an even number, we can write the above equation as $x^2-3m^2=1$, which is recognizable as Pell's equation with solutions of the form $x_n+m_n\sqrt{3} = (x_0+m_0\sqrt{3})^n$. The initial solution is given in the hint as $x_0 = 2k_0 = 2$ and $m_0 = 2j_0+1 = 1$. It can be seen that the parity of x_n toggles as n increases, and since x must be even, we consider only every other value of n by introducing a variable q as follows: $x_{2q+1}+ m_{2q+1}\sqrt{3} = (2 + \sqrt{3})^{2q+1}$ and $x_{2q+3}+ m_{2q+3}\sqrt{3} = (x_{2q+1}+ m_{2q+1}\sqrt{3})\ (2 + \sqrt{3})^2$. This leads to two recurrence relations $x_{2q+3} = 7x_{2q+1}+ 12m_{2q+1}$ and $m_{2q+3} = 4x_{2q+1}+ 7m_{2q+1}$ which with a little algebra can be decoupled to reveal $x_{2q+3}= 14x_{2q+1}- x_{2q-1}$ and $m_{2q+3}= 14m_{2q+1}- m_{2q-1}$. Substituting in for k and j gives $k_{2q+3}= 14k_{2q+1}- k_{2q-1}$ and $j_{2q+3}= 14j_{2q+1}-$

j_{2q-1} + 6. Now we can find successive solutions for j until we find one that is 30 digits long, and we arrive at the result with:

j = 296,892,618,846,717,316,677,163,422,344, which corresponds to a

k = 514,233,100,234,695,607,129,351,718,821.

3: The minimum separation is **0.0263 radians** and occurs at both **2:11:11** and **9:48:49.** The angular positions for each of the three hands H, M, and S over the course of ~12 hours (from a t of 1 second to 43199 seconds) can be expressed thusly: H = t/120, M = t/10 % 360, S = 6t % 360, where % denotes the modulo function. If we denote MAX = max(H,M,S), MIN = min(H,M,S) and MID as the middle angular position, the angles between the hands are: α = 360 – MAX + MIN, β = MID – MIN, γ = MAX – MID. The angular separation ϕ of the three hands is then ϕ = min(α + β, β + γ, γ + α). Using symmetry arguments, we actually need only iterate in one second increments to t = 21600, as for a solution s seconds after 12:00, we can also find a solution s seconds before 12:00. A quick computer program using the relationships described above reveals a minimum ϕ =(181/120)° ≈ 0.0263 radians t = 35329 seconds after midnight, or 2:11:11. The symmetric solution with the same minimum separation is, therefore, 9:48:49.

4: The smallest chessboard that can support a superknights tour is **10x10**. Consider an $N \times N$ chessboard with N odd. The color of the starting square and the last square after the N^2 move will be the same color, and it is, therefore, impossible for the superknight to move back to the original position to close the tour. Thus N must be even. Clearly, N = 2 is too constrained for the superknight to move at all, and N = 4 only allows a maximum of two consecutive moves by the superknight, and these small grids can be ruled out. Consider visiting a corner with N = 6. The previous and subsequent moves must be the same as those for a visit to the opposing corner, thereby creating a loop and preventing a valid solution. Consider visiting a square positioned diagonally adjacent to a corner with N = 8. Again, the previous moves must be the same as those for a visit to the corresponding square adjacent to the opposite corner, and N = 8 is invalidated. Using Warnsdorff's algorithm, we can find a plethora of solutions for N =10. One such tour is shown below:

1	74	31	64	93	26	11	76	33	60
72	15	88	29	62	13	78	17	86	35
65	92	25	100	75	32	59	94	27	10
30	63	2	73	16	87	34	61	12	77
89	44	71	14	91	28	85	36	79	18
24	99	66	47	22	97	52	9	58	95
3	50	41	68	45	54	7	82	39	56
48	21	90	43	70	5	80	19	84	37
67	46	23	98	51	40	57	96	53	8
42	69	4	49	20	83	38	55	6	81

5: A dollar can be converted to coins in **292** different ways. Consider using 2 half dollars; clearly there is only one such way to do this. Now consider using 1 half dollar: with 2 quarters, again there is a single way. With 1 quarter, we can find 12 (2 use 2 dimes, 4 use a single dime and 6 use no dimes). With no quarters, we can find 36 (1 uses 5 dimes, 3 use 4 dimes, 5 use 3 dimes, 7 use 2 dimes, 9 use 1 dime, and 11 use no dimes). This is 49 possible ways with a single half dollar. Lastly, consider using no half dollars: With 4 quarters, there is a single way. With 3 quarters, we are in the same situation as the one half dollar & one quarter case above with 12 ways. Similarly, with 2 quarters, we are in the same situation as the 1 half dollar & no quarters case where there are 36 ways. With 1 quarter, we can find 12 (2 use 7 dimes, 4 use 6 dimes, 6 use 5 dimes, 8 use 4 dimes, 10 use 3 dimes, 12 use 2 dimes, 14 use 1 dime, and 16 use no dimes). With no quarters, we can find 121 ways (1 uses 10 dimes, 3 use 9 dimes, 5 use 8 dimes, 7 use 7 dimes, 9 use 6 dimes, 11 use 5 dimes, 13 use 4 dimes, 15 use 3 dimes, 17 use 2 dimes, 19 use 1 dime and 21 use no dimes). This is 242 possible ways with no half dollars. Therefore, the total number of ways is 1+49+242 = 292.

NEW Brain Tickler Judge

After three and a half years of faithful service to the BTs column, **Gary M. Gerkin**, *CA H '11*, has stepped down as a judge and columnist. We thank him for his dedication and contributions over his tenure, and anticipate his continued participation as a solver!

Tau Bates will soon get a chance to solve puzzles from our newest judge, **Kristopher D. Berthold, P.E.**, *TX B '04*. He is a seasoned solver of Brain Ticklers with an impressive display of perfect entries, and we are happy to have him take on the Spring column working alongside Fred, Chuck, and Jeff.

BTs continue on page 36.

AUGUST 1 — OCTOBER 31, 2023

Alumni Giving

Nagel Club
Robert R. Bailey
TX Ε '70
"Proud supporter of education — it's the way of the future."

Donor Recognition Clubs

The Donor Recognition Clubs are part of our effort to recognize a donor's total lifetime cumulative giving to Tau Beta Pi. **THANK YOU** to the 736 TAU BETA PI ALUMNI and others who made donations to the Association totaling $174,004 between August 1, 2023, and October 31, 2023. The names of donors whose gifts were received after October 31 do not appear here but will be published in the Spring 2024 issue. These club names and amounts, established by the ΤΒΠ Executive Council, are set at the following levels:

$1 MILLION+
Williams Club
Edward H. Williams Jr., Sc.D.
PA A 1875, Founder of Tau Beta Pi

$500,000+
Heikes Club
Irving A. Heikes, *PA A 1885*
1st student member

$250,000+
Harelson Club
Katharine C. Harelson, *KY A 1924*
1st Women's Badge (WB) recipient

$100,000+
Matthews Club
R.C. "Red" Matthews, *IL A 1902*
1st Sec.-Treasurer of ΤΒΠ

$50,000+
Franklin Club
Marjorie A.H. Franklin, *KS A 1957*
1st woman initiated into Sigma Tau

$25,000+
Nagel Club
Robert H. Nagel, P.E., *NY D 1939*
2nd Sec.-Treasurer of ΤΒΠ

$10,000+
Clarke Club
Edith Clarke, WB #95
Inventor of graphic calculator

$5,000+
Evans Club
Henry B. Evans, Ph.D., *PA A 1893*
1st president of Tau Beta Pi

$2,500+
Eaves Club
Elsie Eaves, *CO B 1920*, WB #24
Influential civil engineer

$1,000+
Downing Club
Lewis K. Downing, Ph.D., *MI G 1921*
1st Black HBCU engr. dean

$500+
Moore Club
A.D. Moore, *PA G 1915*, ΤΒΠ president, Fellowship Program founder

$250+
Forman Club
George W. Forman, *IL A 1941*
Led ΤΒΠ/Sigma Tau merger

NOTES:
1. Names preceded by SPEC denote gifts from non-members.
2. Names marked with a † symbol are of deceased members in whose memory donations were made either by relatives and friends or through bequests.

Eaves Club
Nancy T.-T. Chang
MA Β '87
"It is an honor to support ΤΒΠ members, the future innovators and problem-solvers of our society."

Downing Club
Christopher G. Bazinet
NY Γ '79
"Happy to support ΤΒΠ's mission of providing for the next generation of top engineering candidates."

Moore, Forman & Pre-Club Members Listed on website

Due to the number of alumni contributors, the Moore, Forman, and Pre-Club Members will be acknowledged on our website at: *www.tbp.org/?AGP*. All donations are essential to the continued success of the Association, but as print costs rise each issue, these donors will be listed with all of the other contributors in a protected PDF document. If you have questions or concerns, please contact *tbp.development@tbp.org*. Thank you for your understanding as we strive to produce an enjoyable and cost effective magazine for our readers.

$1 MILLION+ Williams Club

No alumni gifts for this quarter

$500,000+ Heikes Club

No alumni gifts for this quarter

$250,000+ Harelson Club

No alumni gifts for this quarter

$100,000+ Matthews Club

OR Α Brandt, Larry Don '67

$50,000+ Franklin Club

AZ Β Myers, Jerry Elwyn '70
MD Β Crane, Tom Clemson '62
NY Γ Donofrio, Nick Michael '67
OH Η Merkle, Larry '92

$25,000+ Nagel Club

SPEC Anonymous
IL Α Ditman, Jason Blair '91
MI Α Colbry, Dirk Joel '06
Colbry, Katy Luchini '99
MI Ε Gomulinski, Curt Dennis '01
NY Δ Angle, Fritz F. '82
NY Κ Knox, Keith Thomas '70
SD Α Gomulinski, Tricia Elizabeth '98
TX Ε Bailey, Bob Richard '70
TX Η Trich, John Albert '70

$10,000+ Clarke Club

CA Γ Tyson Jr., James J. '58
CA Λ Holl, Sue '76
IN Δ Brandt, Dan Melvin '74
LA Ε Champagne Jr., Pierre '76
MI Γ Anonymous '82
MO Β McHenry, S. Dale '81
NJ Β Boysen, Bob Lorenz '63
NY Ζ Mendel, Jerry M. L. '59
PA Γ Spector, Scott Jay '74
PA Η Hettche, Ray Raymond '61
SC Α Harman, Patrick '65
TN Α Cook, Jim Michael '72
Jarratt, Jim Stroud '68
TX Α Anonymous '63
TX Ζ Hambrick, Joanna Ruth '86
VT Α Brand, Ronald Parsons '60
WV Β Payne, Michael E. '81

$5,000+ Evans Club

CA Λ Hall, Vickie Lee '86
CA Ν Joy Jr., Robert Lee '66
CA Ρ Kraft, Lyle David '87
CA Υ Alexander, Joseph William '06
Alexander, Rachel Kristin '15
DE Α Gardiner Jr., Skip Espey '62
FL Α Lewis, Becky Ann '04
IN Α Shaffer, Gerald Harley '74
IA Α Krambeck, Scott David '82
MI Γ Pepper, Julia Lynn '84
MI Ε Strebendt, Richard Ernest '65
MO Γ Taber, Norma J. '80
NJ Β Blasi, Michael G. '68
NJ Δ Yu, Jeff Chih-Ping '89
NM Β Slominski, Paul '78
NY Ε Hellman, Martin Edward '66
NY Θ Bauer, Richard Carlton '66
NY Π Demmel, Hans George '83
NY Ρ Calfa Jr., Frank Salvatore '81
NY Τ Olenik, Anthony Michael '08
OH Δ Penko, Paul Frank '67
OR Α Cantwell, Gary Kenneth '80
PA Ι Salyers, John Marshall '01
SC Β Daley, Leslie N. '71
TX Α Tran, Tan Dai '87
TX Γ Sandmann Jr., Charles W. '82
TX Δ Goodson Jr., Alfred Wesley '70
UT Γ Panatier, Michael James '71
VT Α Ketcham, Ken James '68
WA Α Pierce, Russ W. '70
WA Β Cass, Robert Dennis '83
WV Β Ashman, Michael D. '84
WI Α Frazier, Clive '66

$2,500+ Eaves Club

AL Β Bell III, Willis Vincent '78
AZ Β Latta, David Raymond '89
CA Γ Holmen, Bob R. '85
CA Ε McCandless, Roger James '65
Simsarian, Greg Garabed '82
CA Λ Lieu, Tom '94
Okpisz, Alexander Edward '91
CO Γ Pearson, Larry '64
Ton, Scott Marshall '74
DC Β Maslen, Carrie J. '82
DC Γ Keene, Warren Elmer '57
FL Α Passman, Alan Joseph '06
IN Α Hohn, Richard Edward '62
Papanicolas, Mitchel '65
Risa, Kristen '69
Yoder, Norman Everett '71
IN Β Rosenbarger, Donald Glenn '78
IN Γ Richter, Richard Terrell '70
KY Β Arbaugh, Andrew Carey '95
Thornton, Patrick Joseph '82
MD Α Tate, David Marshall '84
MD Β Antony, Roger William '71
MA Β Chang, Nancy Tien-Tien '87
Patterson, John Bryan '68
MA Δ Raisler, Richard Allen '72
MA Ε Ridlon, Stephen Allan '66
MA Ζ Harrison, C. Brett '64
MI Α Chiti, James D. '71
McIntosh, Carl L. '70
MI Β Lindgren, Douglas LeRoy '69
MI Γ Ardis, Robert Boyd '46
Davies, John Richard '50
Stewart, Steve Russell '66

Alumni Giving

Downing Club
Leah B. Hill
OH Μ ΄10
"Giving to ΤΒΠ supports a wonderful community of the best engineering students."

Eaves Club continued

MI Δ Eberl, Edward George ΄74
Ponticello, John Charles ΄78
MI Ε Boileau, James Maurice ΄87
Zickafoose, Michael Wayne ΄97
MI Θ Garrity, William Edwards ΄70
MO Α Sandfort, Robert Melvin ΄64
NE Α Martin, John Craig ΄85
Steube, Milan Ray ΄74
NV Α Lovekin, James Warren ΄80
NJ Β Rabin, Dan E. ΄73
Rice, Darren Christopher ΄91
NJ Γ Angyal, Stephen ΄63
Mauermeyer, Henry A. ΄72
NM Α Smith, Jeffrey A. ΄84
NM Β Sullivan, Thomas Daniel ΄74
NY Β Phillips, Glen E. ΄71
NY Γ Chamberlin, Donald Melsom ΄67
Ordway III, Fred Delancy ΄69
Stallman, Thomas Frank ΄59
NY Δ Desloge, Joseph Gilles ΄92
NY Λ Petsche, Frank ΄78
NY Ν Zarchy, Andrew Stephen ΄73
NC Α De Haas, Cynthia ΄91
Vercaemert, Carol Starnes ΄76
NC Γ Hovis, John Garrison ΄78
OH Α Ehlert, Donald Arthur ΄84
OH Γ Steiner, William Samuel ΄63
OH Ζ Zelms, Charles Michael ΄73
OH Κ Maki, Luke Richard ΄78
OH Λ Eckhardt, Andrew James ΄79
OK Α Blakeburn II, Dave Lowry ΄83
OK Β Bobo, James Edward ΄77
OR Α Milton, Stuart W. ΄84
Paynter III, W. Burton ΄74
Sias, James Frederick ΄57
PA Α Hernjak, James Gregory ΄96
Lybas, John M. ΄70
Nisley, Elmer Edward ΄74
PA Δ Hocker Jr., Robert Gerad ΄71
PA Η Price, Russell William ΄72
RI Β Bradley, Ken Alan ΄81
TN Α Armentrout, Daryl Ralph ΄65
Davis Jr., Fred Thomas ΄74
TN Β Burnett Jr., Wilton Wright ΄67
Shackleford III, Jim Rufus ΄60
TX Α Howerton, Lloyd Foster ΄51
TX Β Darby, Mark Leslie ΄79
Gilmer, Tracy F. ΄80
MacCallum, Gregory James ΄81
TX Δ Fink, Tami Neal ΄91
Simpson, Stancy Jean ΄79
TX Η Godwin, Albert Eugene ΄84
TX Θ Stokes, F. Xavier ΄78
VA Α Hardy Jr., Edward Ira ΄69

$1,000+ Downing Club

AL Α Anderson, Pete Lawrence ΄75
AL Β Mason, William Warren ΄89
AL Γ Banasiewicz, Kenneth Adrian ΄79
AZ Α Frondorf, George ΄69
AR Α Sharp, Steve Harold ΄76
CA Β Powers, Dana Auburn ΄70
CA Δ Bolliger, James E. ΄71
Haririan, Vida ΄94
Klein, Shelley Marie ΄82
Shields, Linda ΄84
CA Η Zanini, David Victor ΄90
CA Θ Murray, Donald I. ΄72
CA Ι Wrigley, Chris J. ΄96
CA Λ Hines, John Richard ΄73
Sturgeon, Randy Randall ΄70
CA Μ Johnson, Bruce William ΄78
CA Ν Jimenez, Ramon ΄95
CA Ξ Stewart, Diana Frieda ΄83
CA Ο Fiedler, James Michael ΄78
CO Α Oakley, Jilene Marie ΄11
CO Β Davis, Gregg Randal ΄77
CT Β Douglass, Michael Richard ΄79
Pollack, Edward Eliot ΄70
Staniunas II, Joseph William ΄65
White, Bill Richard ΄65
DC Α Hull, Wayne Kenneth ΄59
DC Β Roberts, Carol Ann ΄63
DC Γ Hill, Howard Thiebaut ΄62
Wilhelm, Eugene Bailey ΄86
FL Α Perrygo, Charles Maurice ΄75
Schoppman, Gregg M. ΄08
Vande Vusse Jr., Gerald ΄65
FL Γ Benson, Gary Arthur ΄78
GA Α Kaduck Jr., William Walter ΄76
Northington, Peyton Alexander ΄78
Parker, Jonathan Edward ΄59
Taylor, Hubbard Harvey ΄75
Wetenhall, Paul David ΄73
IL Α Allen, Charles Humphrey ΄66
Bassler III, Robert Edward ΄74
Gromala, Edward Joseph ΄79
Lenzini, Peter Arnold ΄75
Schleicher, Kathy Louise ΄85
IL Β Johnson, J. Randall ΄63
IL Γ Miner, Warren Philip ΄59
IN Α Corns, Joseph Benjamin ΄52
Lee, Robert Edward ΄67
Montgomery, Stephen Tedford ΄71
Pickett, Leroy Kenneth ΄68
IN Δ Lyons, David William ΄71
IA Α Cortum, John David ΄77
Gaul, Alan David ΄83
Haack, Leland Arthur ΄53
Puffett, George E. ΄83
IA Β Monk, David Harold ΄60
KS Α Benso, William Eldon ΄59
Johnson, Lee Samuel ΄77
Struble, Philip William ΄79
KS Β Jaeger, Robert Gene ΄70
KY Α Cook, Robert Henry ΄74
KY Β Yee, Ngai Sandy ΄82
LA Γ Jenkins, James S. ΄80
Mercer, Andy A. ΄59
Randall, James Benjamin ΄79
Wyche III, James Egbert ΄59
MD Α Lu, Stanley ΄95
MD Β Dinkle, Ralph Edward ΄65
MD Γ Kolley, Chester Michael ΄85
MA Α Cucchi, Thomas ΄85
Griffith, Rebecca Anne ΄91
MA Β Ciaramaglia, Frederick Joseph ΄69
Efimba, Bob E. ΄63
Greenspan, Marshall ΄61
Vlahakes, Gus John ΄71
MA Δ Savage, Paul David ΄77
MA Ε Johnson, David Norman ΄77
MI Β Hammar, Richard Harry ΄65
Rom, David Bruce ΄56
Skaugen, Borg ΄63
MI Γ Burkholder, Earl F. ΄73
Capelli, Ronald B. ΄73
Hammond, Donal Dwight ΄52
Hickcox, Timothy Earl ΄65
Miller, Stephen Scott ΄78
Pace Jr., George Donald ΄61
MI Δ Di Cicco, Dominic Armand ΄61
Gallagher, James Anthony ΄68
Kaunelis, Pranciskus Saulius ΄69
MI Ε Brooks, Vern Eugene ΄60
Moses, Michael Joseph ΄00
MI Ζ Tarricone, Louis Guy ΄82
MI Θ Messer, Bryan James ΄98
MI Κ Seymour Jr., Richard L. ΄97
MS Α Bui, Tuan Thanh ΄90
MS Β Simmons, Mary Ann ΄85
MO Α Adams, Charles Ray ΄65
Kehoe, Martin James ΄72
Merz, Jeffrey B. ΄67
MO Β Brewer, Lawrence Oliver ΄77
Brockhaus, Douglas Adolph ΄68
Kyser, Dale Anthony ΄83
Roam, John Harold ΄69
MO Γ Eddy, Jim Dale ΄80
Lum, Thomas ΄51
Salman, Naif Diab ΄56
Shomber, Henry Rolan ΄78
NE Α Matthews, Deborah Jo ΄82
NH Β Cloyd, Joseph R. ΄02
NJ Α MacMillan Jr., Duncan J. S. ΄66
NJ Γ Becker Jr., George William ΄66
DiDomenico, Michael John ΄65
Gagliardo, Reginald Saverio ΄70
Gittes, Marvin Steven ΄63
Tucker, John Harold ΄67
Vandemeulebroeke, Leon C. ΄89
NJ Δ Rafieyan, Kamran Lee ΄89
NY Γ Bazinet, Chris Gerald ΄79
Levinson, Stanley H. ΄78
Walter, Robert Wayne ΄64
Weader II, Richard Jerome ΄64
NY Ε Lee, John H-J ΄70
NY Ζ Chu, Lawrence Joseph ΄71
NY Η Beron, Michael ΄71
Schlein, Robert George ΄72
NY Θ Harris, Everette C. ΄76
Newman, Mitchell James ΄81
NY Κ Epstein, Benjamin Ross ΄78
Singer, Bart Alan ΄82
NY Λ Novakoff, Alan K. ΄74
NY Μ Hansen, Jean Griffith ΄77
NY Ν Pardini, Thomas John ΄77
NY Ξ Tamaro, George John ΄59
Triano, Salvatore John ΄85
NY Ο Putnims, Zigmunds Andis ΄78
NY Π Barber, R. Todd ΄87
NC Α Alexander, Ralph Bell ΄76
Daniels, Eric Andrew ΄85
Davis, John Michael ΄73
Freeman, Theresa Mooney ΄85
ND Α Mittelsteadt, Steven James ΄81
OH Α Koch, Carl Conrad ΄59
OH Β Allspach, Eugene Robert ΄70
OH Γ March, Michael Ross ΄85
Powell, David Allen ΄71
OH Δ Beach, Theodore Lyman ΄87
†Hild Jr., Wilbur Henry ΄64
OH Η Beurket Jr., Raymond Thomas ΄63
Lantier, Ward John ΄63

Downing Club
Marshall Greenspan, Ph.D.
MA B '61
"TBΠ continually encourages and rewards our top qualified engineering students."

Downing Club
Dana A. Powers, Ph.D.
CA B '70
"All members should support the TBΠ staff as enthusiastically as they support the membership."

Downing Club continued

OH Θ Evanzia, Gregorio Patrick '64
Mikalauskas, George Anthony '86
Walsh, Michael Anthony '75
OH I Snyder, Sharon E. '09
OH K Brattoli, Mark A. '79
Volosen, John '77
OH M Hill, Leah Beth '10
OK A Carnes Jr., Albert Cowser '56
Gimpel, Robert Jefferson '73
PA A Brownlie, Thomas John '71
Labovitz, Judith Ann '86
Labovitz, Stuart Lewis '85
Vosseller, Kenneth Franklyn '62
PA B Weston, Matthew Wayne '93
PA Γ Kuhr, Tina Michelle '81
Marietta, William Grey '68
PA Z Eisenberg, Eric Jay '88
PA Θ Corradino, Joseph Carmen '65
Coyle, Todd Frederick '77
PA Λ Steranka Jr., Paul Ott '76
RI A Solomon, John Victor '60
RI B Oliva, Stephen Arthur '67
SC Γ Julich, Thomas Frank '76
Kelly, Robert Thomas '86
TN A Drake, Mark Anthony '82
Oliver, Edward Earl '66
TN B Brown, George Arthur '55
Casson, Leonard Walter '81
Hodges Jr., Willie Erwin '67
TN Γ McCormick, Jack Randall '64
TX A Cardwell, John Wesley '68
Krieg, Raymond David '60
Moss, Edward R. '64
TX B Fleming, Liz Ann '79
TX Γ Altman, Thomas Clark '70
TX Δ Richards, Tamela L. '81
TX H Schaeper, Wilfred H. '76
Tepper, John C. '82
UT B Hart, Robert Evan '73
VA A Dye, Michael Loren '87
WA A Bullock, Dennis Eugene '76
WA B Groat, J. Everett '94
WV A Boggs, Mark Steven '80
Ramsey, Walter Jackson '74
Schuler, Arthur Kurt '71
WV B Bennett, Chris John '06
WI A Berman, Neil Sheldon '55
Senty, Jim Anton '60
WI B Swiontek, Thomas John '69

IN THE COLLEGES

Tau Bates having an impact at institutions of higher learning

Daniel D. Anastasio Ph.D.

Connecticut Beta '09

Daniel was presented the Raymond W. Fahien Award for outstanding teaching effectiveness and educational scholarship by the ASEE's chemical engineering division. He was also part of a team of educators receiving the David Himmelblau Award from AIChE for outstanding innovations in computer-based chemical eng'g education. He is an assoc. professor at Rose-Hulman Inst. of Tech. (IN).

Cory J. Berkland Ph.D.

Iowa Alpha '98

Cory is joining the faculty at Washington University in St. Louis as a professor of biomedical engineering. He previously was a Distinguished Professor at the Univ. of Kansas and is co-founder and chair of three companies: Bond Biosciences, Kinimmune, and Axioforce. His research merges eng'g & biological sciences to develop novel therapeutics and biomaterials.

Karen J. Bursic Ph.D.

Pennsylvania Lambda '84

Karen was elected a fellow of the American Society for Engineering Education (ASEE) for "her work on curriculum development, faculty development, and student success." She is an industrial engineering professor and undergraduate program director at the University of Pittsburgh Swanson School of Engineering. Karen has concentrated on improving engineering education since 1994.

SPOTLIGHT: Planned Gift to Support Arkansas Engineering— The University of Arkansas (UA) received a $10 million planned gift from **Rick J. Moore,** *AR A '80,* that will endow funds for scholarships, a professorship, faculty recruitment, and provide additional funds to benefit the department of chemical engineering. Moore spent 29 years as president of Ford, Bacon & Davis before retiring in 2020 and passed away on August 28, 2023. In recognition of his contributions, the UA College of Engineering is naming an undergraduate teaching lab in his honor. Earning his B.S. degree in chemical engineering from UA as a non-traditional student, he later returned to serve on a ΤΒΠ alumni panel, where he advised students to learn to write well, speak well, and communicate ideas effectively.

U.S. DOE Funding for Hydrogen Technologies— More than $47 million in funding for 16 projects across 13 states to accelerate the research, development, and demonstration of affordable clean hydrogen technologies was announced in September. The U.S. Hydrogen and Fuel Cell Technologies Office stated that "projects funded under this opportunity will focus on lowering technology costs, enhancing hydrogen infrastructure, and improving the performance of hydrogen fuel cells." Each project is classified under one of the four hydrogen-related topics. GE Research will lead a project to develop liquid hydrogen tank technology for heavy trucks and aircraft, which is one of three projects within the Onboard Storage Systems for Liquid Hydrogen topic.

Cassandra M. Birrenkott Ph.D.

South Dakota Alpha '07

Cassandra has been accepted into the 2023-24 Executive Leadership in Academic Technology, Engineering and Science (ELATES) program at Drexel University. She also received a scholarship to cover tuition in this leadership development program. Cassandra is an associate professor of mechanical eng'g, at South Dakota School of Mines, SD Alpha Chapter Chief Advisor, and ΤΒΠ Scholar (2006).

Ritchie Chen Ph.D.

California Alpha '10

Ritchie joined the University of California, San Francisco faculty this year and is the recipient of two fellowships: The 2023 Klingenstein-Simons Fellowship Award in Neuroscience for "understanding emotions by studying brain-body pathways," and Packard Fellows for Science and Engineering class of 2023. He was cited for his lab's work in developing cell-type-specific tools and devices to study the neurobiology.

Yuzhang Li Ph.D.

California Alpha '13

Yuzhang was selected as a 2023 Packard Fellow for Science and Engineering. He was cited for leading the Li Group, inventing novel tools that can directly image the electrified interface between a liquid and solid containing the electrical double layer. This work will provide new insights for technologies in sustainability and health. He is an assistant professor at UCLA and scientific advisor for Aionic, Inc.

Ronald A. Metoyer Ph.D.

California Epsilon '94

Ronald was appointed to the post of vice president and associate provost for teaching and learning at the University of Notre Dame. He is a computer science & eng'g professor, associate dean for diversity and faculty development, and an IN Gamma Chapter advisor. In his new role, Ronald will oversee Notre Dame Learning and serve as a member of the President's Leadership Council.

Benjamin Paren Ph.D.

Pennsylvania Gamma '16

Ben has joined the Stevens Institute of Technology (NJ) as an assistant professor of chemical engineering and materials science. A postdoctoral research assoc. at MIT, his focus is on solvent and ion transport mechanisms in liquid and polymer electrolytes. His degrees in materials science & eng'g include a B.S. and M.S. from Carnegie Mellon Univ. and a Ph.D. from UPenn.

Alex N. Prybutok Ph.D.

Texas Alpha '16

Alex co-authored *Designing and Implementing a Workshop Intersection between Social Justice and Engineering*, which won the 2023 Best Diversity, Equity, and Inclusion Paper Award at the ASEE Conference. She recently joined the University of Washington as an assistant teaching professor after completing her Ph.D. in chemical & biological engineering at Northwestern University.

FACILITIES: University of Rochester Facility for Ultrahigh-Intensity Lasers — Rochester was awarded nearly $18 million over three years from The National Science Foundation to design and prototype key technologies for EP-OPAL, a new facility dedicated to the study of ultrahigh-intensity laser-matter interactions. The Omega Laser Facility at Rochester currently houses two very powerful lasers — OMEGA and OMEGA EP — that are used by scientists around the world. EP-OPAL, an acronym for "OMEGA EP-coupled Optical Parametric Amplifier Lines," will be designed to add two of the most powerful lasers in the world and harness the high-energy laser capabilities. As such, the facility has the potential to be a unique open-access resource for the scientific community.

UT Dallas Battery Technology Initiative— The Department of Defense awarded the University of Texas at Dallas $20 million over three years to "develop and commercialize new battery technologies & manufacturing processes, enhance domestic availability of critical raw materials, and train high-quality workers." The award will lead to the creation of a prototype Energy Storage Systems campus and the Batteries and Energy to Advance Commercialization and National Security center. UT Dallas president **Richard C. Benson, Ph.D.,** *NY K '73,* says the excellence of the academic programs in engineering and science and ability to leverage partnerships with industry put UTD in a position to lead this national effort to drive battery innovation.

Allen L. Robinson Ph.D.

California Gamma '90

Allen is the new Colorado State University College of Engineering Dean. Previously at Carnegie Mellon University, he was director of CMU-Africa in Rwanda, COE Associate Dean for International Programs in Africa, and founding director of the Center for Air, Climate, and Energy Solutions. Allen has a civil engineering B.S. degree and M.S. and Ph.D. degrees in mechanical engineering.

John L. Tatarko Ph.D., P.E.

Ohio Epsilon '09

John was appointed as an assistant professor of chemical & biomolecular engineering at Clarkson University (NY). His research is in the areas of enhanced transport properties of nanoparticle-infused base oils and data-mining via self-organizing feature maps. His chemical eng'g Ph.D. and electrical and chemical eng'g M.S. are from the University of Louisville.

Matthew J. Trussoni Ph.D., P.E.

Wisconsin Delta '03

Matthew was named the Engineering Faculty Member of the Year by the Florida Engineering Society at their 2023 Annual Conference. He is an assistant professor in practice at the Univ. of Miami and principal of the Trussoni Architecture Group. Published in the *ACE Materials Journal*, he is a registered architect, and earned his B.S. in architectural engineering at MSOE.

CHAPTER ETERNAL

Our fellow Tau Bates who are gone, but never forgotten.

LA Γ

Louisiana Gamma '67
Philip H. Kitchens
September 7, 2023
Was hired by Werner von Braun to the team that developed the Saturn V rocket which took the Apollo 11 astronauts to the moon. Supported ΤΒΠ *scholarships as a major donor.*

The condensed style of these notices is made necessary by the Association's large membership and space limitations in *The Bent*. You may contact the Editor for additional facts (if available) concerning the following deceased members. The assistance of all is earnestly sought in reporting the deaths of Tau Bates, including full name and date of death. You may report the death of a member by sending an email to ***tbp.memberupdate@tbp.org.*** Members 100 or more years when passing are identified with "***Cent.***"

ALABAMA

ALPHA AL Α

Finfrock, Martin Frank, *'51*, May 31, 2019.
Hyde Jr., Reuben L., *'56*, July 22, 2012.
Culberson, Billy Lee, *'57*, Dec. 22, 2017.
Strickland, Carl Donald, *'57*, June 11, 2022.
Vachon, Reginald I., *'58*, December 24, 2020.
Meadors, John Gilmore, *'59*, October 5, 2020.
Lackey, Robert Grayson, *'60*, Feb. 17, 2021.
Allgood, Robert Noble, *'76*, May 17, 2022.

BETA AL Β

Teshkoyan, Edward R., *'46*, Sept. 3, 2022.
Bentley, John Paul, *'56*, October 30, 2021.
Davis, Bervil Delone, *'57*, July 3, 2018.
Brown, Melvin Frank, *'59*, Nov. 18, 2020.
Mann Jr., William Hugh, *'59*, Jan. 10, 2022.
Jury, Floyd Derwood, *'61*, Feb. 25, 2019.

ARKANSAS

ALPHA AR Α

Harmon, Wilbur Darrell, *'49*, no details.
Bates, Donald Ray, *'57*, February 11, 2023.
Moore, Ricky Lynn, *'80*, August 28, 2023.

CALIFORNIA

ALPHA CA Α

Blackmer, William H., *'54*, Feb. 28, 2023.
Thiele, Ernest Emil, *'56*, Dec. 25, 2018.
Johnson, Eugene Edmond, *'58*, no details.
Routbort, Jules Lazar, *'60*, March 1, 2012.
Maeda, Homer Yoshito, *'62*, April 21, 2023.

BETA CA Β

Greenwood, Don T., *'44*, Dec. 26, 2018.
Haire, Alan Marshall, *'53*, Nov. 15, 2020.

GAMMA CA Γ

Parker, Henry Whipple, *'45*, July 7, 2023.

DELTA CA Δ

Lyddon, Richard M., *'58*, March 31, 2019.
Duckworth, John E., *'66*, June 17, 2023.

EPSILON CA Ε

Wikholm, Duane Eser, *'55*, Aug. 30, 2023.
Buell, Jeffrey Curtis, *'80*, May 1, 2023.

ZETA CA Ζ

Allison, James Edward, *'55*, June 5, 2023.

ETA CA Η

Zimmerman, Norman B., *'57*, Feb. 11, 2023.
Kikugawa, James R., *'66*, March 10, 2006.

THETA CA Θ

Koblitz, Gordon Frank, *'66*, Nov. 4, 2022.

XI CA Ξ

Self, Gary George, *'78*, no details.

PI CA Π

Mullen, Merritt David, *'70*, June 22, 2023.

COLORADO

ALPHA CO Α

Burckert, Roger B., *'53*, no details.

BETA CO Β

Solomon, David, *'49*, December 22, 2021.
Nicholls, Robert Lee, *'51*, April 22, 2022.
Endicott, John Seward, *'53*, Sept. 26, 2021.
McLagan, C. Bruce, *'54*, August 1, 2019.
Pettingill, Gene Meader, *'55*, June 23, 2023.
Barry, Philip Harris, *'57*, July 2, 2018.
Hislop, Sherman L., *'57*, June 25, 2008.
Gilles, Brandon Lee, *'08*, August 4, 2023.

GAMMA CO Γ

Lee, Don Evard, *'59*, August 17, 2023.
Morton, Richard Austin, *'74*, July 17, 2020.

CONNECTICUT

ALPHA CT Α

Sawyer, Baldwin, *'43*, no details.
Partridge, Gordon R., *'46*, Nov. 5, 2009.
Schwartz, Kenneth S., *'47*, March 5, 2023.
Weyerhaeuser, George H., *'49*, no details.
Weber, Richard Joseph, *'50*, Feb. 6, 2022.
Englund Jr., David Robert, *'51*, no details.
Singer, Frederick Lawrence, *'57*, no details.
Beardwood, Bruce Allan, *'58*, Nov. 2, 2014.
Block III, Philip Dee, *'58*, July 1, 2016.
Hartman, John Sampson, *'98*, July 1, 2023.

BETA CT Β

Ferris, Clarence Craig, *'55*, Jan. 3, 2020.

DELAWARE

ALPHA DE Α

Bolgiano Jr., Louis Paul, *'43*, Jan. 12, 2022.
McCullough, Don Lee, *'51*, Nov. 12, 2016.
Homewood, Gary B., *'58*, April 20, 2018.
Andrusko, Frank George, *'59*, Oct. 4, 2021.

FLORIDA

ALPHA FL Α

Hines Jr., Andrew H., *'47*, Feb. 21, 2021.
Gerlach Jr., Philip Earl, *'57*, Nov. 23, 2012.

GAMMA FL Γ

Jain, Vijay K., *'56*, May 1, 2022.
Carnahan, Robert Paul, *'59*, June 2, 2018.

GEORGIA

ALPHA GA Α

Greene, Kendall, *'46*, March 27, 2004.
Johnson, Ewell Calvin, *'47*, April 22, 2017.
Huckaby, James Cicero, *'49*, Aug. 2, 2021.
Reed Jr., Charles Philip, *'50*, July 24, 2021.
Winter, Donovan Lewis, *'50*, Nov. 1, 2021.
Seckman, John R., *'52*, Jan. 12, 2001.
Warren Jr., Walter B., *'53*, Feb. 17, 2023.
Cummins Jr., William F., *'54*, Feb. 29, 2012.
Alford, Cecil Orie, *'56*, December 18, 2019.
Bartlett, Harwood, *'56*, Sept. 21, 2020.
Gossage, Tommy L., *'56*, March 27, 2022.
Jenkins Jr., Herndon H., *'56*, Feb. 4, 2021.
Keith, Henry Grady, *'56*, May 28, 2022.
May, James Edward, *'56*, Sept. 7, 2015.
Ray, Dale Carney, *'56*, December 23, 2020.
Trammell Jr., Robert D., *'56*, Oct. 30, 2018.
Charak, Ira, *'57*, April 24, 2023.
Chew, Jong Ming, *'57*, May 19, 2023.
Edwards Jr., Joseph Lee, *'57*, Jan. 9, 2018.
Blanton Jr., Roy Warner, *'58*, May 12, 2010.
Dundervill, Walter Earl, *'58*, May 21, 2020.
Mori, Jean Albert, *'58*, December 1, 2020.
Sims, Wade King, *'58*, March 24, 2018.
Alford, Samuel Thomas, *'59*, May 9, 2023.
Hines, William Whaley, *'59*, June 25, 2019.
Longley, John Daniel, *'60*, May 25, 2015.
Sommer, Tommy Russell, *'60*, Oct. 1, 2018.
Turner, Richard Neil, *'60*, March 17, 2018.
Wilson, Howell Kenneth, *'60*, April 1, 2016.
Roper Jr., Frank E., *'61*, Dec. 17, 2021.
Hill, Gene Ray, *'62*, July 22, 2020.
Phillips, Joseph Edwin, *'64*, July 14, 2023.

ILLINOIS

ALPHA IL Α

Fraser Jr., Edward S., *'39*, Sept. 23, 2014.
Mueller, Robert H., *'42*, March 11, 2023. ***Cent.***
Long, George M., *'43*, February 20, 2014.
Herda, William Kenneth, *'46*, June 2, 2022.
Nalepa, Henry James, *'49*, Nov. 25, 2021.
Chang, Rodney Kam Jan, *'51*, May 23, 2019.
Deuchler Jr., Walter E., *'51*, May 15, 2023.
Nelson, Gordon Kent, *'51*, April 5, 2021.
Vogel, Richard A., *'51*, no details.
Kasper, Frank Stanley, *'52*, May 7, 2023.
Pocock, Clifford Eugene, *'52*, May 26, 2023.
Messner Jr., John R., *'53*, Feb. 19, 2018.
Stump, Larry Earl, *'53*, Nov. 13, 2021.
Thomasson, Gene Irvin, *'53*, no details.
Koscielny, Robert Michael, *'54*, no details.
Womeldorff, Porter J., *'54*, April 27, 2020.
Rachner, Jerome E., *'55*, Nov. 28, 2022.
Mahoney, Gerald Lee, *'56*, March 30, 2020.
Pesce, Carlo Amatore, *'56*, Aug. 22, 2023.
Remec, Mathew Joseph, *'56*, April 9, 2022.
Whateley, Baron C., *'56*, Sept. 10, 2021.
Humphrey, Wayne L., *'57*, August 21, 2018.
Templeton, Mark Miller, *'59*, Jan. 3, 2023.
Huffaker, Donald C., *'60*, February 15, 2023.
Pyatt, Roger Allen, *'60*, June 10, 2014.
Sugita, Richard K., *'62*, Sept. 18, 2020.
Ruhl Jr., Harold John, *'66*, Sept. 17, 2023.
Baliga, John V., *'85*, July 28, 2022.
Rasmussen, Valerie A., *'88*, Nov. 29, 2017.

BETA IL Β

Sevin, Eugene, *'49*, June 26, 2023.
Kapoun, Robert, *'52*, July 1, 2012.
Najita, Kazutoshi, *'53*, October 14, 2016.

Augustine, Paul Conley, *'54*, Jan. 26, 2014.
Kim, Tong Soo, *'54*, January 5, 2019.
Marcolini, Victor Henry, *'54*, Aug. 3, 2018.
Sotich, Charles A., *'54*, March 23, 2014.
Trnka, Ralph John, *'54*, May 1, 2019.
Barnett, Ralph Lipsey, *'55*, no details.
Bass, Sidney, *'55*, no details.
Turner, Amos, *'55*, no details.
Chez, Eugene Leonard, *'56*, no details.
Ganzel, Joseph R., *'56*, October 15, 2016.
Tamas, Edward Francis, *'56*, Sept. 30, 2019.
Yule, Lawrence Robert, *'56*, February 1, 2020.
Samocki, Chester John, *'57*, Nov. 27, 2022.
Uretz, Eugene Frank, *'57*, Sept. 20, 2015.
Weber, Ronald C., *'57*, March 24, 2022.
Mavrides, George M., *'58*, June 13, 2003.
Walter, Gordon Henry, *'58*, May 10, 2022.
Karimoto, Frederick K., *'59*, Oct. 21, 2014.
Wenshutonis, Robert, *'59*, Sept. 28, 2022.
Yuen, Paul C., *'59*, November 8, 2012.
Rolnicki, Edwin Walter, *'60*, January 20, 2017.
Fitzgerald, Frank R., *'61*, June 28, 2021.
Brunka, Lee Morris, *'71*, Sept. 12, 2023.

GAMMA IL Γ

Diggs, Donald Roger, *'44*, Dec. 26, 2014.
Pancoe, Robert W., *'45*, August 31, 2012.
Reis, Paul George, *'45*, October 23, 2020.
White Jr., Kendall D., *'45*, February 18, 2021.
Jacobs, John Edward, *'47*, no details.
Kegel, Adam G., *'47*, no details.
Dobson, Donald Alfred, *'50*, Nov. 21, 2021.
Fegen, James Francis, *'54*, July 30, 2022.
Brugliera, Vito Gregory, *'55*, Jan. 26, 2013.
Christensen, Robert W., *'55*, May 25, 2021.
Fleming, Donald K., *'55*, September 19, 2019.
Geppert, James Alan, *'55*, March 19, 2019.
Johnson, Delmar Ronald, *'55*, July 12, 2016.

DELTA IL Δ

Schultheis, Colin Robert, *'10*, July 28, 2023.

INDIANA

ALPHA IN A

Griner, Robert Homer, *'48*, no details.
Shanker, Morris G., *'48*, August 18, 2020.
Adamson Jr., Thomas C., *'49*, Oct. 9, 2016.
Adamson, William Joseph, *'49*, Sept. 7, 2021.
Arden, Bruce Wesley, *'49*, December 8, 2021.
Retzloff, James B., *'49*, November 30, 2015.
Sheppard, Stanton Vincent, *'49*, no details.
Sokolowski, Edward R., *'49*, April 17, 2021.
Bieber, Myron Jay, *'50*, February 6, 2017.
Flanigan, Eugene Elton, *'50*, May 1, 2017.
Wray, Phillip Glenn, *'51*, March 8, 2021.
Jenter, Donald Harry, *'53*, March 24, 2014.
Daily, Ralph Delphord, *'54*, Nov. 20, 2014.
Bottum, Edward Stuart, *'55*, no details.
Kramer, Leonard John, *'55*, June 19, 2019.
Rain, Robert Louis, *'55*, November 28, 2021.
Atterholt, James William, *'57*, August 9, 2023.
Bajusz, Alex Joseph, *'57*, March 1, 2019.
Barnhill, Donald Henry, *'57*, October 6, 2022.
Bronson, Henry D., *'57*, March 6, 2023.
Lockhart, Lawrence Leslie, *'57*, Oct. 2, 2015.
Moeschl, Stanley Francis, *'57*, May 7, 2020.
Chodash, Eugene Michael, *'58*, no details.
Rust, James Harold, *'58*, August 3, 2023.
Iwahiro, George Takeshi, *'59*, January 5, 2023.
Sindelar, Charles James, *'59*, May 12, 2017.
Stephenson, James M., *'59*, April 9, 2020.
Storer, Thomas Bruce, *'59*, August 24, 2012.
Walesky, John William, *'59*, June 22, 2018.
Paul, Edward Ray, *'60*, May 31, 2018.
Ditzler, John William, *'61*, July 7, 2023.
Jason, Richard Harry, *'61*, Dec. 18, 2022.
Tolley, Robert Eugene, *'61*, Sept. 19, 2021.
Waller, Joseph Daniel, *'61*, January 24, 2021.
Carstens, Dale Lynn, *'62*, March 24, 2015.
Parmelee II, Gordon Victor, *'62*, no details.
Collins, Lewis Dye, *'63*, July 12, 2023.
Uhran Jr., John Joseph, *'63*, October 2, 2023.

BETA IN B

Leppert, Joseph Herman, *'56*, April 21, 2014.

GAMMA IN Γ

Krauss, Norman Edward, *'58*, Sept. 26, 2020.
Milne, Francis Edward, *'58*, August 29, 2023.
Prosser, Howard Frances, *'59*, May 29, 2023.

DELTA IN Δ

Schultz, Ronald Glen, *'53*, Dec. 29, 2021.
Vocke, Merlyn Clarence, *'55*, March 4, 2023.
Ilten, Mark Owen, *'72*, June 28, 2023.

IOWA

ALPHA IA A

Slater, John B., *'43*, October 31, 2021. ***Cent.***
Weinstein, Alex, *'43*, April 16, 2022.
Kubias, Frank Owen, *'50*, July 30, 2007.
Scheider, Merwin R., *'50*, March 7, 2023.
Reneker, Darrell Hyson, *'51*, Oct. 17, 2021.
Coffland, Richard Allen, *'54*, Dec. 28, 2014.
Anderson, Albert Frank, *'56*, Feb. 9, 2021.
McDonald, John Garwin, *'57*, July 14, 2021.
Waters, William Clement, *'57*, April 26, 2021.
Graham, Robert Jost, *'59*, December 7, 2022.
Balloun, James Stanley, *'60*, Feb. 25, 2023.

BETA IA B

Gertsma, Laurence W., *'55*, no details.

KANSAS

ALPHA KS A

McCabe, Vincent Joseph, *'46*, Oct. 14, 2012.
Sanders, Richard Francis, *'51*, Feb. 25, 2020.
Hess, Joseph Brian, *'89*, September 2, 2023.

BETA KS B

Snyder Jr., Melvin Henry, *'47*, Feb. 25, 2012.

KENTUCKY

ALPHA KY A

Windes, Stanley Burton, *'52*, August 28, 2016.

BETA KY B

Fleming, John Edwin, *'84*, no details.

LOUISIANA

BETA LA B

Larocca, Anthony Joseph, *'49*, Sept. 30, 2015.

GAMMA LA Γ

Riggs, Donald Raymond, *'56*, July 4, 2023.
Stewart, James Edward, *'65*, April 13, 2020.
Kitchens, Philip Hudgins, *'67*, Sept. 7, 2023.

MAINE

ALPHA ME A

Norton Jr., Stanley C., *'51*, July 26, 2016.
Miller, Phillip A., *'74*, January 8, 2023.

MARYLAND

ALPHA MD A

Salemi, Robert Michael, *'49*, Dec. 17, 2019.
Hancock, Walton Milton, *'51*, Feb. 27, 2019.
Krauss, Jacob John, *'55*, December 2, 2010.

BETA MD B

Rolnick, Jerome Marvin, *'53*, no details.
Tinnan, Leonard Maury, *'53*, May 3, 2021.
Wybenga, Ferdinand A., *'55*, August 31, 2020.

MASSACHUSETTS

ALPHA MA A

Keyl, Walther August, *'50*, Dec. 23, 2019.

BETA MA B

Oppenlander Jr., Robert, *'44*, no details.
Cox Jr., Jerome R., *'47*, January 17, 2023.
Green, Malcolm, *'50*, December 13, 2022.
Rigas, Augustas C., *'51*, December 18, 2021.
Chandler, William P., *'52*, February 20, 2021.
Hollister, Walter Mark, *'53*, Sept. 9, 2023.
Kolodkin, Stanley Solomon, *'54*, Feb. 6, 2022.
Shifrin, Walter Goodman, *'55*, July 7, 2022.
Alcorn, William Robert, *'57*, Sept. 22, 2015.
Taylor Jr., Robert Grant, *'57*, Feb. 18, 2018.
Delaat Jr., Peter James, *'58*, March 28, 2013.
Manheim, Marvin Lee, *'59*, August 10, 2000.
Holmes, Lee Maurice, *'60*, no details.
Verderber, Joseph Anthony, *'60*, April 3, 2018.

EPSILON MA E

Mindick, Morris, *'49*, August 5, 2023.
Wing, James M., *'57*, July 20, 2022.
O'Leary, Raymond Paul, *'74*, June 26, 2023.
Higgins, Thomas Edward, *'77*, March 5, 2023.

ZETA MA Z

Blackmer, Randall Gale, *'52*, June 29, 2020.
Rogers, David Owen, *'56*, July 31, 2020.

MICHIGAN

ALPHA MI A

Chapman Jr., Carroll B., *'49*, Jan. 20, 2012.
Osborn, Miles Herbert, *'50*, Feb. 17, 2015.
Parker, Delmer Gene, *'55*, October 28, 2020.
Colthorp, Alger Burton, *'56*, October 18, 2011.
Lapensee, Ernest Richard, *'57*, May 26, 2022.
Near, Charles W., *'61*, January 1, 2020.

BETA MI B

Roper, Kenneth Hall, *'46*, October 1, 2012.
Dickinson, Elbert Gale, *'49*, Feb. 19, 2022.
Matson, Robert Paul, *'49*, Dec. 15, 2020.
Shu, Hsien-Hwi Hunter, *'53*, Dec. 3, 2016.
Mattson, Rodney Arnold, *'55*, March 19, 2018.
Schroeder, Mel Orville, *'56*, January 24, 2023.
Schwark, Gerald John, *'56*, June 8, 2018.
Nilsen, John N., *'57*, September 14, 2015.
Youngs, Philip Curtis, *'57*, August 5, 2003.
Hornbostel, Raymond A., *'60*, Jan. 3, 2021.

GAMMA MI Γ

Sivacek, E. Elmer, *'41*, January 22, 2007.
Wilson III, Charles W., *'45*, Nov. 29, 2011.
Glass, David Roger, *'46*, January 19, 2023.
Sullivan, Roger Draffen, *'46*, no details.
Frey, Julian, *'48*, January 16, 2022.
Cindric, George Thomas, *'49*, Dec. 31, 2017.
Heines Jr., Thomas S., *'49*, April 21, 2017.
Anderson, Curtis Rodney, *'50*, Dec. 15, 2021.
Beeley, Raymond James, *'50*, April 24, 2015.
Debler, Walter Ralph, *'50*, Dec. 29, 2020.
Ganzhorn, Donald William, *'50*, Aug. 8, 2018.
Wise, David Stewart, *'50*, September 4, 2021.
Brungraber, Robert J., *'51*, June 27, 2022.
Eisley, Joe Griffin, *'51*, no details.
Merte Jr., Herman J., *'51*, October 20, 2022.
Boddy, Leland David, *'53*, March 2, 2021.
Lee, Harry, *'54*, February 6, 2005.
Wilkes, James Oscroft, *'54*, Dec. 6, 2020.
Davies, David Greer, *'55*, March 26, 2020.
Burchfield, Jack Edward, *'56*, July 15, 2023.
Graessley, William Walter, *'56*, Feb. 18, 2017.
Lucyshyn, Peter Stephen, *'56*, Oct. 8, 2022.
Sonntag, Richard Edwin, *'56*, Feb. 6, 2010.
Kibens, Valdis, *'57*, July 1, 2016.
De Losh, Robert Gordon, *'58*, March 26, 2022.
Kreger, John Charles, *'58*, February 5, 2018.
Vedejs, Arthur Guntis, *'59*, January 26, 2022.
Harper, Glenn Edward, *'61*, no details.
Laidlaw, Charles Edward, *'62*, Dec. 27, 2018.
Reddy, Vinay N., *'82*, October 13, 2022.

CHAPTER ETERNAL

Continued

PA
A

Pennsylvania Alpha '56
Ferdinand Thun
July 30, 2023
An engineer and philanthropist, he served as Lehigh Univ. director of planned giving for 22 years and established with his wife, a scholarship to support 1st generation U.S. citizens from immigrant families.

DELTA MI Δ
Kersich, Albert Thomas, *'52*, March 21, 2020.
Weimer, Aloysius George, *'58*, July 23, 2015.
De Witt, Richard Leo, *'59*, January 21, 2021.
EPSILON MI E
Boone, Earl Thomas, *'51*, October 24, 2013.
Toth, Robert Lewis, *'51*, December 5, 2019.
ZETA MI Z
Petzold, Merlin Albert, *'56*, Sept. 22, 2023.
Rider, Richard A., *'61*, no details.
ETA MI H
Barry, Robert E., *'50*, January 26, 2022.
IOTA MI I
Miller, Murray Henri, *'50*, April 28, 2017.

MINNESOTA

ALPHA MN A
McIrvine, John Douglas, *'51*, June 12, 2022.
Bartsch, Merton Lee, *'53*, July 12, 2020.

MISSISSIPPI

ALPHA MS A
Gammage, William Errol, *'57*, Feb. 19, 2021.
Ward, Linley Kent, *'58*, November 8, 2013.
Miner Jr., Frank Henry, *'60*, January 25, 2018.

MISSOURI

ALPHA MO A
Price, Albert Magnus, *'49*, Sept. 8, 2023.
Hiltenburg, Robert Layton, *'61*, Sept. 1, 2018.
Gillespie, Wallace Donald, *'65*, May 20, 2022.
BETA MO B
Scott Jr., Harry S., *'44*, July 28, 2022. ***Cent.***
Bush, Arthur Joe, *'47*, March 24, 2000.
Bach Jr., Wilbert Edward, *'50*, June 3, 2023.
Carl, Ralph W., *'53*, August 24, 2022.
Goeddel, James Peter, *'54*, January 31, 2022.
Baebler, Arthur George, *'55*, March 9, 2015.
Bohres, William Carl, *'56*, October 9, 2015.
Link, August L., *'56*, May 5, 2022.
Longshore Jr., James F., *'56*, Aug. 15, 2021.
Abernathy, James Lee, *'57*, Feb. 28, 2021.
Chorzel, Joseph Paul, *'57*, July 6, 2022.
Brendecke, Roger C., *'58*, August 20, 2020.
Haydon, Jack Bruce, *'58*, February 13, 2019.
Dunn, Vernon Dwight, *'60*, July 13, 2021.
Wisdom, Gerald Henry, *'60*, Sept. 15, 2018.
Husman, David N., *'61*, no details.
Hilligoss, Edward Allen, *'76*, July 18, 2023.
GAMMA MO Γ
Smith, Alvin Howard, *'47*, Sept. 26, 2022.
Ellis, Shepard, *'50*, May 5, 2022.
Fischer, John Theodore, *'50*, Aug. 22, 2021.
Shapiro, Norman Jaye, *'53*, June 7, 2017.
Sandefur, Richard Bennett, *'54*, Feb. 19, 2022.
Elfanbaum, Alan, *'56*, October 13, 2013.
Duffey, Harry Joseph, *'57*, July 22, 2020.
Hoekel, Thomas Frank, *'57*, July 15, 1993.
Dencker, Elmer Henry, *'58*, July 27, 2016.
Petri, George William, *'58*, October 30, 2020.
Lindauer, Gustav A., *'60*, July 7, 2014.
Brandhorst, Charles W., *'62*, Dec. 31, 2015.

NEW HAMPSHIRE

ALPHA NH A
Corrette, Richard Harry, *'50*, April 29, 2013.
York, Richard Joseph, *'55*, May 20, 2009.
Donahue, James Ernest, *'58*, April 29, 2023.

NEW JERSEY

ALPHA NJ A
Miron, James Bruce, *'51*, August 13, 2003.
Ortlieb, William Lawrence, *'53*, Nov. 27, 2017.
Schatmeyer, John Frederick, *'57*, May 5, 2023.
BETA NJ B
Llewellyn, William Frame, *'41*, no details.
Patricelli, Robert A., *'51*, April 12, 2016.
Dillmeier, Robert A., *'52*, April 13, 2023.
Filipski, Stanley Paul, *'58*, Nov. 23, 2022.
GAMMA NJ Γ
Kahn, Bernard, *'50*, July 13, 2023.
Sikora, Robert Carl, *'51*, June 4, 2021.
Smith, Walter Richard, *'52*, Nov. 1, 2017.
Taetzsch, William Louis, *'52*, March 13, 2022.
Iatesta, Salvatore, *'57*, September 13, 2013.
Varetoni, Thomas A., *'59*, August 12, 2011.
Coffman Jr., Roger Lee, *'03*, Feb. 14, 2023.
DELTA NJ Δ
Gary Jr., Tom Crumley, *'47*, April 29, 2010.
Aaron, H. Osborne, *'48*, June 9, 2008.
Jahn, Robert George, *'51*, Nov. 15, 2017.

NEW MEXICO

ALPHA NM A
Abernathy, George Henry, *'52*, May 7, 2022.
Pollard, Joseph Warren, *'56*, Jan. 30, 2022.
Creed, Joe L., *'59*, December 12, 2012.

NEW YORK

ALPHA NY A
Kraus, George, *'49*, June 1, 2007.
Ruszkay, Richard John, *'58*, March 22, 2023.
LaMantia, Charles Robert, *'61*, Nov. 1, 2019.
BETA NY B
Delvecchio, Anthony C., *'52*, Dec. 30, 2009.
GAMMA NY Γ
Long Jr., Edward LeRoy, *'45*, July 21, 2023.
Gray, Robin Bryant, *'46*, April 6, 2022.
Hoey, James Karnes, *'48*, July 25, 2015.
Brueger, John Martin, *'52*, no details.
Anderson, Olof L., *'53*, September 18, 2021.
Moreau, James Walter, *'53*, May 1, 1992.
Whipple, Caryll Robbins, *'53*, Feb. 7, 2017.
Warshay, Marvin, *'55*, no details.
D'Wolf Jr., James Francis, *'57*, May 7, 2022.
Fritz, Edward James, *'58*, May 1, 2016.
Pellett, Gerald Lee, *'58*, February 18, 2021.
Rezek, Joseph William, *'59*, Dec. 29, 2020.
Lunde, Richard Charles, *'67*, July 6, 2020.
DELTA NY Δ
Riddiford, Alan W., *'60*, June 2, 2022.
EPSILON NY E
Breedis, John, *'56*, July 26, 2023.
Laventhal, Harry S., *'56*, November 11, 2007.
Bastone, Anthony Dan, *'58*, August 27, 2002.
Spock, Robin Erskine, *'58*, no details.
Elphick, Michael Sidney, *'73*, no details.
ZETA NY Z
Kutin, Lawrence H., *'55*, March 31, 2022.
Middlebrook, Victor S., *'56*, Sept. 6, 2023.
Liang, Tso, *'61*, June 9, 2014.
ETA NY H
Kansas, Robert, *'45*, September 1, 2020.
Ganz, Werner, *'50*, no details.
Greber, Isaac, *'50*, November 15, 2022.
THETA NY Θ
Miannay, Charles R., *'50*, August 20, 2022.
IOTA NY I
Goldberg, Harold Seymour, *'44*, July 17, 2023.
NU NY N
Caprio, James Rocco, *'61*, no details.
Heck Jr., Joaquim Lewis, *'71*, June 27, 2023.
XI NY Ξ
Bradley, William John, *'60*, July 5, 2021.
RHO NY P
Han, Chang Dae, *'58*, July 25, 2021.

NORTH CAROLINA

ALPHA NC A
Zia, Paul Zung-Teh, *'49*, August 16, 2023.

OHIO

ALPHA OH A
Ponstingl, John Carl, *'41*, January 19, 2016.
Veigel, Marshall Albert, *'41*, Dec. 16, 2009.
Poffenberger Jr., James C., *'42*, Dec. 22, 2018.
Leary, Arthur Pearson, *'44*, Sept. 21, 2016.
Gross, Morton Jerome, *'45*, January 19, 2019.
Bernotas, Ralph Joseph, *'49*, Sept. 11, 2010.
Schuerger, Richard G., *'49*, March 10, 2022.
Zahn, Wayne Edward, *'49*, February 27, 2014.
Kilroy, John William, *'50*, no details.
Tschannen, Robert Albert, *'50*, Aug. 5, 2022.
Varga, Richard Steven, *'50*, Feb. 25, 2022.
Hinde, William Lawrence, *'51*, Oct. 26, 2011.
Fetheroff, Charles Walter, *'52*, no details.
Steigerwald, Edward Anthony, *'52*, no details.
Tomazic, William Anthony, *'52*, July 4, 2017.
Kerby, Jack Charles, *'53*, October 17, 2017.
Litzler, Thomas Charles, *'53*, no details.
Tryon, Henry Bell, *'53*, November 15, 2015.
Hall, John Charles, *'54*, September 18, 2019.
Hudson, Lewis Fitz, *'54*, no details.
Mukai, Taro, *'54*, September 1, 2013.
Reinmann, John Joseph, *'54*, no details.
Schoeffler, James D., *'55*, May 12, 2018.
Sidley, Robert Claire, *'55*, November 24, 2022.
Stecca, Eugene Anthony, *'56*, June 1, 2022.
Tripp, James Edward, *'56*, November 1, 2022.
Balhorn, William Homer, *'57*, no details.
Kutina, Kenneth Lee, *'58*, no details.
Kicher, Thomas Patrick, *'59*, no details.
Miller, Edward Frederick, *'59*, Oct. 9, 2018.
Thompson, William Lee, *'60*, Dec. 29, 2021.

BETA OH B

Mindheim, Robert E., *'53*, July 10, 2017.
Buynacek, Edward John, *'57*, Sept. 17, 2018.

GAMMA OH Γ

Grabill, Ernest Charles, *'45*, Sept. 21, 2017.
Games, Donald W., *'47*, October 13, 2022.
Chernin, Myron Allen, *'51*, May 16, 2019.
Cochoff, Victor, *'51*, March 11, 2010.
Aldrich, Robert Francis, *'52*, Oct. 23, 2018.
Jaffe, Alvin Harold, *'53*, February 28, 2016.
Friedman, Donald Warren, *'55*, Dec. 8, 2020.
Cammarn, John Wells, *'56*, July 17, 2023.
Beachler, John C., *'57*, June 11, 1989.
Johanson, Fred Robert, *'60*, October 2, 2022.
Kuebeler, Paul William, *'60*, Dec. 9, 2022.
Settles, Robert Andrew, *'61*, June 18, 2014.

DELTA OH Δ

Horvath, Donald G., *'57*, October 27, 2015.
Yacobucci, Howard Guy, *'58*, Sept. 18, 2021.
Glynn, Thomas Edward, *'59*, Sept. 20, 2020.

EPSILON OH E

Weeton, John Waldemar, *'44*, Oct. 16, 2003.
Klingshirn, Eugene, *'46*, February 26, 2021.
Main, Fred Lloyd, *'50*, January 31, 2012.
Plum, George Leverate, *'50*, June 17, 2017.
Breymaier, Robert W., *'52*, August 22, 2004.
Furman, Edward Richard, *'53*, July 12, 2011.
Vary, Alex, *'58*, June 14, 2023.
Richley, Edward Anthony, *'59*, March 8, 2018.
Winslow Jr., Paul C., *'59*, April 20, 2020.
Bruey, Alfred Joseph, *'61*, Nov. 11, 2021.
Moore, Chad, *'65*, January 18, 2014.
Le, Tung Huy, *'93*, no details.

IOTA OH I

Gatton, Lawrence Gene, *'57*, Feb. 19, 2018.

OKLAHOMA

ALPHA OK A

Lemon, Richard Frank, *'45*, no details.
Goldsmith, Frederick C., *'50*, Aug. 22, 2013.
Moody Jr., Thomas Aubrey, *'50*, Aug. 9, 2005.
Griffin, William A., *'59*, August 25, 2023.

OREGON

ALPHA OR A

Larson, Milton Byrd, *'50*, June 18, 2022.
Blair, David William, *'52*, July 15, 2018.
Robinson, Alan Hadley, *'56*, April 23, 2020.

PENNSYLVANIA

ALPHA PA A

Bigelow, Charles R., *'46*, January 15, 2020.
Roberts Jr., Carlyle Jones, *'50*, May 26, 2022.
Nevis, Benjamin Edward, *'55*, May 9, 2021.
Thun, Ferdinand, *'56*, July 30, 2023.
De Paul, Robert Allen, *'61*, June 26, 2021.
Cassel, Wendel Richard, *'62*, March 11, 2016.

BETA PA B

Smith, Perry Cuyler, *'48*, September 4, 2021.
Jammal, Joseph N., *'50*, January 16, 2013.
Brown Jr., Glenn Robbins, *'52*, no details.
Rothrock, Elmer Weyman, *'53*, May 1, 2016.
Foster, Richard Donald, *'55*, June 8, 2023.
McCarthy, Robert Vincent, *'56*, Aug. 1, 2018.
Bonser, Richard H., *'61*, July 30, 2022.

EPSILON PA E

Matthias, Wilson Howard, *'51*, Aug. 16, 2022.
Sigmond, Leif R., *'52*, November 4, 2016.

ZETA PA Z

Jensen, Warren Russell, *'48*, May 15, 2017.
Meyer, Charles Henry, *'48*, January 11, 2019.
Kienzle, Harry Gallager, *'53*, Sept. 11, 2021.
Crosson, Jerome Michael, *'57*, April 26, 2020.
Hager, Thomas Charles, *'58*, Dec. 9, 2008.
Hilbert, Carl Edgar, *'58*, November 3, 2017.
Beck, George Raymond, *'59*, Jan. 13, 2014.
Skilton, Harry Augustave, *'59*, Oct. 6, 2019.

ETA PA H

Fidrych, Leon Frederick, *'49*, March 14, 2023.
Caracciolo, Vincent Peter, *'50*, June 8, 2015.
Doberstein, Stephen Carl, *'50*, Feb. 21, 2020.
Lewish, William Thomas, *'51*, July 4, 2014.

IOTA PA I

Lorenz, Bryen E., *'76*, December 18, 2022.

RHODE ISLAND

BETA RI B

Post Jr., Arthur Holder, *'57*, August 8, 2023.

SOUTH CAROLINA

ALPHA SC A

Brown, Charles Victor, *'56*, June 16, 2023.
Hagen Jr., Paul Amberg, *'57*, June 28, 2023.
Rickenbacker, James E., *'64*, Jan. 21, 2022.

BETA SC B

Norman, Harold Leonard, *'53*, Dec. 8, 2013.
Gibbons, Joseph Harrison, *'56*, July 5, 2023.
Prince, Terry Brice, *'61*, August 24, 2022.
Kennedy, Renee Annette, *'84*, Jan. 1, 2015.

GAMMA SC Γ

Osterkamp, Hubert A., *'57*, Dec. 17, 2005.

SOUTH DAKOTA

ALPHA SD A

Bultsma, Orville Len, *'92*, July 16, 2023.

BETA SD B

Hanson, John Melvin, *'53*, May 26, 2017.

TENNESSEE

ALPHA TN A

Rowe, Fred Earnest, *'44*, March 9, 2021.
Cates, Robert Eugene, *'48*, Nov. 11, 2020.
Atadan, Erdem, *'50*, December 11, 2018.
McConnell Jr., Oaklie K., *'51*, Sept. 21, 2023.
Cannon, William Harold, *'52*, July 15, 2023.
Patton, James Leeland, *'54*, May 26, 2018.
Bowker, James S., *'59*, June 1, 2019.
Trotter, James Edward, *'59*, Dec. 17, 2020.
Arnold, Gray Johnson, *'61*, Dec. 25, 2016.
Sterchi, John Gates, *'79*, August 5, 2023.

BETA TN B

Stump, Orville M., *'56*, October 12, 2016.
Bender, Richard Thomas, *'65*, Aug. 11, 2023.

GAMMA TN Γ

Widmer, Thomas E., *'59*, August 6, 2017.

TEXAS

ALPHA TX A

Lipscomb, Thomas Richard, *'50*, Jan. 10, 2015.
Mahla, Curtis Harry, *'52*, August 29, 2021.
Kothmann, Richard E., *'59*, January 21, 2023.
Humphreys, Robert Ples, *'60*, Oct. 23, 2019.
Craver Jr., William Lionel, *'62*, May 22, 2023.

BETA TX B

Brosta, Ladimir, *'58*, December 5, 2013.
Womble, James Arn, *'91*, October 2, 2021.

GAMMA TX Γ

Singer Jr., Isaac M., *'52*, September 18, 2023.
Spencer, Robert Ryder, *'54*, Sept. 1, 2023.

DELTA TX Δ

Keene, George Thomas, *'50*, July 25, 2019.
Jones, Wescomb R., *'51*, April 1, 2019.
Sturdivant, Kenith Ray, *'58*, October 11, 2013.
Munson Jr., Joseph U., *'60*, July 2, 2023.

EPSILON TX E

Quitter, James Moses, *'61*, Dec. 15, 2004.

VIRGINIA

ALPHA VA A

Hathaway, Samuel D., *'47*, April 27, 2018.
Fountain, Frank S., *'52*, November 25, 2022.

BETA VA B

Gilbert, Willis Don, *'51*, September 17, 2023.
McEachern, Robert Monte, *'57*, May 10, 2023.
Phillips, Neubert Clayton, *'57*, July 5, 2023.
Robins Jr., Clinton H., *'58*, no details.
Skrivseth, Kenneth Arnold, *'67*, Aug. 10, 2023.

WASHINGTON

ALPHA WA A

Jabusch, Donald Arthur, *'60*, July 20, 2022.

BETA WA B

Miller, Garry Ray, *'57*, August 16, 2019.
Plitkins, Andrew, *'63*, June 4, 2016.

WEST VIRGINIA

ALPHA WV A

Teter, William David, *'59*, July 12, 2014.
Raiders Jr., Robert John, *'78*, June 5, 2014.

WISCONSIN

ALPHA WI A

Zamzow Jr., William H., *'48*, August 10, 2022.
Urben, Leon Jacob, *'51*, August 20, 2020.
Hurley, Thomas William, *'56*, Feb. 9, 2014.
Sholts, Richard Albert, *'57*, Feb. 21, 2022.
Albrecht, Arlyn Elmer, *'60*, April 23, 2021.

BETA WI B

Delahunt, Philip John, *'52*, Nov. 5, 2014.
Veliath, Felix Joseph, *'53*, August 27, 2010.
Hennings, Marvin A., *'56*, March 22, 2011.
Renner, Frank D., *'56*, October 14, 2008.
Voissem, Norman Herman, *'56*, Dec. 4, 2021.
McChesney, Herbert R., *'57*, April 13, 2018.

SIGMA TAU

TAU CHAPTER

Range, Donald L., *'51*, July 30, 2023.

Fall Brain Tickler Answers *Continued from page 25*

BONUS:

The filled table is as follows:

Husband	Wife	Hat
Alf	Beatrice	Gentians
Bert	Daisy	Aspidistras
Charlie	Agnes	Edelweiss
Duggie	Clarissa	Fuchsias
Ernie	Flossie	Begonias
Fred	Gertie	Dahlias
George	Ermyntrude	Crocuses

From statements B1 and E1, Beatrice must tell the truth. From F2, Daisy and Bert are married. C1 must be false, so Clarissa lies. From C3, we can see that Ermyntrude must be a liar as well. From E1, Alf lies and is not married to Ermyntrude or Clarissa. From E2, Charlie's wife wears Edelweiss. From E3, Clarissa is not Ernie's wife. From B2, Fred must be married to Gertie.

Using C2 and the fact that Clarissa cannot be married to Alf, Charlie, or Ernie, Clarissa must be married to Duggie (who tells the truth). Since Ermyntrude cannot be married to Alf, Charlie, or Ernie, Ermyntrude must be married to George (who tells the truth). From A1, it is clear that since George is truthful, Agnes is as well. From A2, Ernie's wife has a Begonia hat, and thus he is not married to Beatrice.

From D1, since Duggie is married to Clarissa and Alf lies, Daisy must lie as well (and her husband Bert tells the truth). From D2, Ernie must tell the truth and cannot be married to Agnes, so he must be married to Flossie. From D3, Fred's wife (Gertie) is not wearing a Crocus hat.

Considering G1, with Flossie wearing a Begonia hat and Bert telling the truth, Gertie also tells the truth and hence her husband Fred lies. From G2, Bert's wife (Daisy) has an Aspidistra hat. Of the remaining unpaired people, Alf cannot be married to Agnes and thus must be married to Beatrice, so Charlie is both married to Agnes and is a liar.

The only possible unassigned hat that Fred's wife (Gertie) can wear is the Dahlia. From B3, George's wife (Ermyntrude) is not wearing a Fuchsia hat, so it must be Crocuses. Beatrice must be wearing a hat with Gentians and Clarissa must be wearing the Fuchsia hat. This gives the result shown in the table.

COMPUTER BONUS:

999,331 A short computer program will uncover 55 unique circular primes, the largest one under 1 million turns out to be 999,331.

New Winter Problems

1: New Tic-Tac-Toe

Otto likes to play Tic-tac-toe with his young son, Xavier. (Tic-tac-toe is played on a 3×3 grid; the players take turns placing an "X" or an "O" in any unoccupied grid opening and the first player to get three in a row wins.) However, they get bored, because, as they both know how to play the game, no one ever wins. To overcome this problem, Otto decides to modify the game as follows. He numbers the grid squares from 1 to 9 (top row: 1, 2, 3; middle row: 4, 5, 6; bottom row: 7, 8, 9). He then places 9 ping pong balls, numbered 1 through 9, in a bag. Xavier (Otto always lets him go first, but never deliberately lets him win) reaches into the bag, draws a ping pong ball, and places his "X" in the square corresponding to his draw. Otto then draws one of the remaining balls and places his "O" in the corresponding square. Thereafter, play proceeds in the normal way. What is the exact probability that Xavier will win?

—**Thomas G. Norris,** *OK A '56*

2: Lost Sea Ships Order

The Battle of the Lost Sea is little remarked by today's historians, but at the time it took place, it changed the balance of power in the countries bordering the Lost Sea. Eight Lower Slabobian ships (including the famed Gar) defeated 11 Ebonian vessels in a stunning upset. A reporter decided to write up the battle. He learned that the Slabobian Navy, in order to have all their guns aimed at the enemy, was assembled in a line and was also able to dig up the following additional information.

I. The Albacore was the second vessel behind Capt. S's ship (which wasn't in positions 1 or 5).

II. Capt. W's Hammerhead followed immediately Capt. T's ship, which was not the Bass.

III. The Coho was in position 5.

IV. Capt. U's ship was immediately behind Capt V's ship.

V. Capt. X's vessel occupied a position immediately behind the Dogfish and immediately ahead of the Eel.

VI. Capt. Y's ship was in position 4.

VII. The captain of ship 2 has fewer medals than the captain of the Flounder, which wasn't in position 1 or 3.

VIII. The captain of ship 1 had more than four medals.

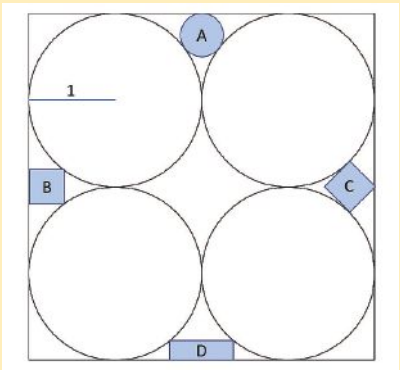
IX. The captains had the following number of medals S-6; T-4; U-5; V-5; W-4; X-5; Y-6; Z-6.

Even with all this information, the reporter was unable to determine the exact order of the ships in the line. You should be able to do better. List the ships and their captains from 1 to 8.

—*USA Today*

3: Magnitude of Circles

The four circles shown in the attached figure have equal radii (one unit) and fit exactly in the 4×4 square. A is a small circle touching two circles and the 4×4 square. B and C are squares. B has an edge on the 4×4 square and two vertices touch circles. C has two edges touching circles and one vertex touching the 4×4 square. D is the largest rectangle that can be fitted in with an edge on the 4×4 square and two vertices touching circles. Arrange A, B, C, and D in order of magnitude, putting the one with the biggest area first.



—*New Scientist:* Stephen Ainley

4: Progression of a Square

Consider the following eight arithmetic progressions:

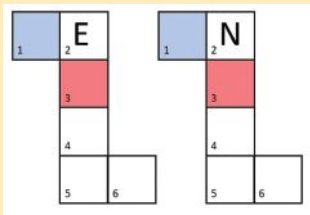
1+2+3+ ... +n
1+3+5+ ... +(2n–1)
1+4+7+ ... +(3n–2)
1+5+9+ ... +(4n–3)
1+6+11+ ... +(5n–4)
1+7+13+ ... +(6n–5)
1+8+15+ ... +(7n–6)
1+9+17+ ... +(8n–7)

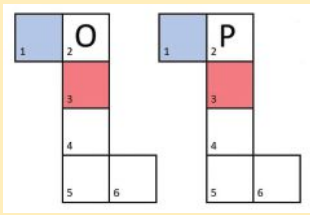
For which of these is there no n >1 such that the sum is a square? For which two of them are there values of n such that the sum is the perfect number 2,305,843,008,139,952,128?

—*Technology Review*

5: Cubic Dice with Letters

I have four cubic dice, but instead of customary pips, each die face is marked with a letter. For each of the four dice, I choose to tumble it to one of the adjacent four faces, or leave it alone. After completing these actions (or inactions), I anagram the resulting letters facing up to spell a (legal Scrabble) word. I then repeat the same tumbling process several times. Starting with OPEN, my subsequent words are GAUD, IAMB, DEFY, OWNS, PAUL, XYST, RICE, TERN, DAZE, BUND, HOPS, FEUD, AVOW, CUKE, before ending with SHUT. What is the configuration of each die? To make grading simple, provide four strings of six letters as ordered in the die nets below. Make the blue shaded square as early in the alphabet as possible, and afterwards, do the same for the red shaded square.





—**Jeffrey R. Stribling, Ph.D.,** *CA A '92*

BONUS:

Joan had a cup of coffee sitting on a horizontal surface in her car as she drove around a level track with a half-mile diameter, slowly increasing speed until the cup tipped over. The cup was a cylinder three inches in diameter by four inches high, full to the brim and sealed with a non-leaking lid. (There was enough friction between the cup and the surface it was on to prevent sliding.) Joan then replaced the lid with a cylindrical extension that, prior to tipping, was high enough to prevent spills over the top, and repeated her drive around the track, again slowly increasing speed until the cup tipped over. You may assume the cup, the lid, and the extension are all of negligible weight and thickness. What was the difference in her speed when the cup with the extension tipped over and her speed when the cup with the lid tipped?

—**Robert N. Spong,** *UT A '58*

COMPUTER BONUS:

Find the smallest prime number which immediately precedes a prime gap of exactly 200. A prime gap is simply defined as the difference between two consecutive primes. For example, the prime 89 immediately precedes a prime gap of 97–89 = 8; it turns out no smaller primes bookend a prime gap of 8.

—Adapted from **Don A. Dechman,** *TX A '57 (deceased)*

Email your answers (plain text only) to any or all of the Winter Brain Ticklers to *BrainTicklers@tbp.org* or by postal mail to **Dylan Lane, Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697**. The method of solution is not necessary. The Computer Bonus is not graded. Where possible, exact answers are preferable to approximations. The cutoff date for entries to the Winter column is the appearance of the Spring *Bent* which typically arrives in late March (the digital distribution is several days earlier). We welcome any interesting problems that might be suitable for the column. Dylan will forward your entries to the judges who are **F.J. Tydeman,** *CA Δ '73;* **J.C. Rasbold,** *OH A '83;* **K.D. Berthold, P.E.,** *TX B '04;* and the columnist for this issue,

— **J.R. Stribling, Ph.D.,** *CA A '92*

PRESIDENT'S REPORT

CONTINUED FROM PAGE 12

EMINENT ENGINEERS

The EC uses a quarterly report system and task management software to formalize communication, review committee proposals, and track our progress. We recently approved a proposal from the DEI Committee to actively recruit and initiate diverse eminent engineers from underrepresented groups. Eminent engineer candidates are individuals who exhibit all the qualities of a member of the Association but were not initiated into membership while pursuing an engineering degree. For collegiate chapters, initiating eminent engineers can be a means to develop new chapter advisors and create a network of alumni for chapter support. This proposal is in keeping with our Strategic Plan. Our Constitution and Bylaws define the eligibility of eminent engineers in Article II, Section 5.

FINANCES

The Association's finances include several components including donations, merchandise sales, and proceeds from money invested in our Trust. TBΠ's fiscal year is from August to July. The Alumni Giving Program received donations from 9,400 members with total giving for the period of August 2022 to July 2023 at $2,000,416. The Tau Beta Pi Trust was valued at $35.7M in August 2022, and $38.8M in July 2023. The Trust is managed by our corporate trustee, Vanguard, and five Tau Bates with financial investment backgrounds were appointed to the Trust Advisory Committee (TAC) by the EC. Overall, the mission of the TAC is to ensure assets of the investment trust are managed prudently and in accordance with the long-term needs of the Association.

Another means to strengthen our financial development is through the Chapter Endowment Initiative (CEI) program. Donations from individuals, companies, and foundations to the CEI permanently endow the Association's activities at any of our 255 collegiate chapters. Endowed chapters receive permanent financial support for some of the activities that directly benefit our collegiate members and cultivates a great membership experience. We received gifts and pledges from 129 individual donors for 79 chapters and 29 chapters are fully endowed.

ENGINEERING FUTURES

The award-winning Engineering Futures (EF) Program provides professional development training. New curriculum was developed in collaboration with CyberAmbassadors and funded by the National Science Foundation in 2017. Since then, more then 11,200 participants have attended over 390 sessions using the new EF curriculum. The curriculum offers our members and communities training focused on communications, teamwork, and leadership skills. Director Katy Colbry and our Facilitators are truly elevating TBΠ in our communities by providing outreach and service sessions with other organizations, companies, and programs.

SCHOLARSHIPS & FELLOWSHIPS

A large portion of our Trust is designated to providing scholarships and fellowships. Awards have been distributed to more than 4,148 undergraduate scholars since 1998 and 1,799 graduate fellowships since 1928. Our Fellowship Program is the key component in our advancement of engineering education and the profession. The Association awarded 265 scholarships and 32 graduate fellowships in 2023.

TARGETED MESSAGES

The 2023 Convention's Image and Marketing Committee was asked to evaluate and identify communication messages for college campuses and how to target the messages for our various audiences. My good friend, Vice President Ron Hickling, wrote his Council's Corner (page 2) about our Identity and how defining that will help guide us. The EC will take the recommendations from the Convention and incorporate them into goals for the Strategic Plan.

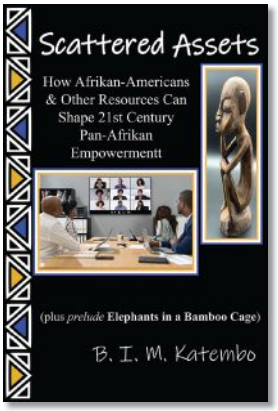
FINAL THOUGHTS

Our most important goal is to improve Chapter Support and Operations. Many chapters are still struggling as we rebound from the pandemic. The Student Advisory Board (SAB) and the Chapter Development Committee are great resources for chapters. I also encourage all Tau Bates to network with each other through our social media channels to share ideas and resources. When you have questions or need support, please reach out to your District Directors, local alumni, Headquarters, and the Executive Council. Together, *we* can improve the Association.

RACHEL ALEXANDER works as an associate civil engineer for the Sacramento Area Sewer District. She was first elected to the TBΠ Executive Council in 2019, was re-elected in 2022, and served as president in 2023. Her B.S. degree is in civil engineering from California State University, Sacramento, and she is a registered professional engineer in California.

Authors

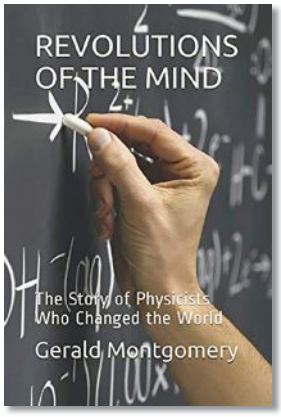
Recently published a book? If so, we would like to recognize you! Send details and a cover image to d.lane@tbp.org. Note: Due to the popularity of this section, submissions are first come, first served, as room allows. Thanks!



Baruti I. M. Katembo
North Carolina Epsilon '87

Scattered Assets: How Afrikan-Americans & Other Resources Can Shape 21st Century Pan-Afrikan Empowerment

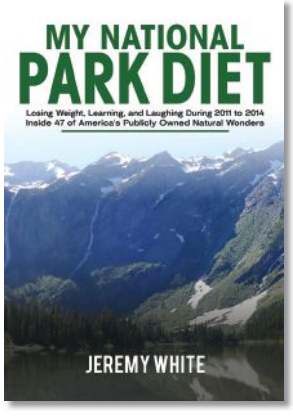
A non-fiction book, the author's first, is a conduit for readers to examine Pan-Afrikan empowerment through the lens and use of various disparate assets that need to be harnessed and systematized. Baruti has been a university mathematics faculty member and holds a B.S. in industrial engineering from NC A&T State University.



Gerald T. Montgomery
Iowa Alpha '55

Revolutions of the Mind: The Story of Physicists Who Changed the World

Gerald is a retired engineer whose book is designed to help those new to the world of physics understand the revolutions that have occurred in the last century. This book of reviews looks at 32 stories in 7 categories written by extraordinary physicists. Readers will appreciate how much our lives and minds have been changed by these famous and often "unsung heroes."



Jeremy M. White
Missouri Beta '97

My National Park Diet

This self-published memoir details Jeremy's efforts to visit all 48 National Parks in the contiguous United States in less than three years and to lose 48 lbs in the process. A chemical engineer who developed packaging for PepsiCo products (mostly Gatorade), he wrote this book while between jobs. In 2018, Jeremy suffered a traumatic brain injury, but has recovered, and included an epilogue on his accident in the book.

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youtube.com/c/TheTauBetaPiAssociationInc

THE GREATEST SHOW ON EARTH

By: **Trudy E. Bell** ©2023 Trudy E. Bell

E-Day is Monday, April 8, 2024, mid-afternoon. Here are tips for full appreciation of the upcoming total eclipse of the sun.

By the time you read this, you'll likely have heard about the upcoming April 8 total solar eclipse—last one to be visible from the contiguous U.S. states until the back-to-back August eclipses of 2044 and 2045. You'll likely also have heard explanations of the phenomenon's cause (the moon's coming exactly between the earth and the sun). So rather than repeating those basics, here are first-hand tips for enjoying the solar system's greatest show on earth.

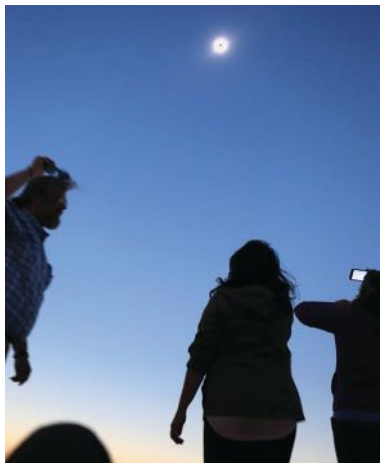
GET THEE TO TOTALITY

The difference between a 99-percent partial eclipse and a total solar eclipse may be just 1 percent of the sun's surface, but it's essentially 100 percent of the experience. That difference is what makes some people repeatedly travel thousands of miles to stand in the right place on earth for a few minutes of totality. I'm one of them — I've chased the moon's shadow six times. Amazingly, despite clouds, I've seen the totally eclipsed sun all six times.

In 2024, the path of totality will be a swath less than 125 miles wide within the umbra, the densest part of the moon's shadow, as it sweeps northeast from Mexico through Texas, across Ohio and Maine into Canada. The closer you get to the center line of the path of totality, the longer the duration of totality—up to over four minutes in 2024, much longer than in 2017.

STAY MOBILE

Stay flexible and mobile. For all but my first solar eclipse in Mexico in 1970, weather predictions were dicey.



The eclipsed sun above silhouettes of the author's daughter (center) and two Nebraska hosts was photographed by lying back on the ground in Wyoming in 2017. (Hump at bottom left is the author's knee.) Credit: Trudy E. Bell

In the Arctic (Tuktoyaktuk, in Canada's Northwest Territories) in 1972, thick fog kept our chartered plane grounded, but the clouds opened just for a few minutes right before totality. In 2017, predictions for Crete, Nebraska, were for thunderstorms; so based on satellite images, our professor host made a 3 a.m. call for us to hightail it 500 miles west to clearer skies in eastern Wyoming.

WATCH PARTIAL PHASES SAFELY

The classic apparatus for watching the hour or so of partial phases of the eclipse—from so-called "first contact" (when the moon first starts covering the sun) until "second contact" (the beginning of totality)—is a pinhole projector. Humble though it is, it works, it is safe, and it's easy for kids to build. You can improvise a pinhole projector with your hands: curl thumb and forefinger of one hand to create a tiny hole and project the image of the sun on the palm of your other hand.

Engineers wishing to build a projector giving a larger and sharper image of the sun (including sunspots) can find plans for Safe Solar Viewers using one or two lenses from dollar-store reading glasses [see "DIY Resources" sidebar].

Many people like to watch the moon advance across the sun directly through ultra-dark eclipse shades [details in "DIY Resources"]. Personally, I find it exhausting to look directly at the sun's face, even through the shades, and prefer watching events unfold on a projection screen. Try both.

MONITOR LANDSCAPE AND SKY

Although the sun is the star attraction, keep an eye on the rest of the sky and on the landscape to behold phenomena never seen at any other time.

Several minutes just before or after totality, shadow bands may start flickering across the ground. Shadow bands are long, faint, low-contrast, irregular stripes of shadow that scurry over people and trees, somewhat resembling the ever-moving shadows of ripples on the bottom of a swimming pool. They are believed to be refraction or diffraction of sunlight through fine atmospheric turbulence, when the sun's crescent becomes so narrow it behaves like a slit. In 1970, under ideally clear skies, shadow bands were unmistakable, especially on plain white surfaces; during later eclipses seen through airborne dust or haze, they were only weakly visible or even absent.

Then there is the engulfing lunar shadow, which in April will approach from the southwest, almost directly below the sun itself. You may see the southwestern horizon darken and the darkness spread rapidly, thrilling, and inexorable as an approaching tidal wave.

Major U.S. cities that will be within the path of totality on April 8, 2024, include Dallas, Indianapolis, Cleveland, Buffalo, and Rochester. Other major cities on the edge or just outside the path include San Antonio, Austin, Fort Worth, Louisville, Fort Wayne, Ann Arbor, Detroit, Cincinnati, and Columbus, plus Toronto and Montreal in Canada. Map credit: Michael Zeiler, *GreatAmericanEclipse.com*

SEE THE SUN BLACKED OUT

Totality drops with astonishing suddenness, the sky darkening to a steely blue or teal green—a shade never seen in any other natural setting; the entire horizon may be ringed with soft yellows, oranges, and reds. Remove any eclipse shades and gaze upward. Above, the sun's silvery corona (outer atmosphere) glows forth in feathery soft glory, its exact shape and structure depending on solar activity. Through binoculars, you may see flame-like ruby or magenta solar prominences suspended a small distance away from the moon's edge.

Look around the rest of the sky—away from the eclipsed sun, several planets or even one or two bright stars may gleam. Watch and listen how birds, cows, or insects may react to the unexpected deep velvet blue midday twilight. Feel how the air temperature may have dropped. Note your own and others' emotional responses to the celestial event.

The minutes fly. All too soon, the southwestern edge of the eclipsed sun brightens—a warning to get ready to resume wearing eclipse shades as the lunar shadow continues racing northeast. Totality may end with "Baily's beads" as the first bits of sun show themselves in valleys between profiled lunar mountains, and one bead may grow into the classic "diamond ring effect." The last of the shadow bands fade away as wildlife resumes daytime behaviors.

ONE LAST THOUGHT ...

More than 135 years ago, astronomy writer Mabel Loomis Todd asked Hamilton College astronomer C. H. F. Peters what single instrument he would select for observing a total solar eclipse. His reply: "A pillow." Despite all the eclipses he had observed as a scientist, he regretted never taking time simply to appreciate the rare and stunning event as a poetic soul.

So, don't miss totality on April 8. And just give yourself time—a few minutes free of earthly appointments to behold a majestic celestial appointment of earth, moon, and sun.

TRUDY E. BELL, M.A. (*t.e.bell@ieee.org*), is a member of the 2024 Eclipse Cleveland Planning Task Force, headed by representatives from NASA Glenn and the Great Lakes Science Center. A former editor for *Scientific American* and *IEEE Spectrum* magazines, she was also senior writer for the Univ. of California High-Performance AstroComputing Center. Trudy is author or co-author of a dozen books and 600+ articles. Most recently, she was co-editor of *Neptune: From Grand Discovery to A World Revealed* (Springer, 2021).

DIY RESOURCES

Directions for building a simple pinhole projector from an empty cereal box are given in a one-minute animated tutorial from NASA: *www.youtube.com/watch?v=vWMf5rYDgpc*. Late in the partial phases, a straw hat or anything with small holes will project multiple images of the crescent sun.

Instructions for building Safe Solar Viewers that project a larger and sharper solar image are at *http://richardsont.people.cofc.edu/safe_solar_folder/index.html*.

Ultra-dark eclipse shades may be available from local science centers and astronomical societies. ***Beware cheap knock-off imitations; they may not block all harmful solar radiation.*** Use only those shades that conform to the international standard ISO 12312-2. The American Astronomical Society offers information and reputable sources at *https://eclipse.aas.org/resources/solar-filters*.

For planning where to be in the path of totality based on detailed discussions of regional weather odds, two essential resources are *Road Atlas for the Total Solar Eclipse of 2024* by Fred Espenak (NASA's long-time "Mr. Eclipse" guru) and *Eclipse Bulletin: Total Solar Eclipse of 2024 April 08* by Fred Espenak and Jay Anderson. Both large-format paperback books are available from Amazon in either digital or hard copy forms. Spring for the color editions. The two complementary references are vital if at the last minute you need to outrun clouds.

Many people find a total solar eclipse to be an unexpectedly emotional experience. This aspect is explored by British clinical psychologist and dedicated eclipse chaser Kate Russo in her book *Total Addiction* (Springer, 2012).

ASSOCIATION BRIEFS

Alumni Chapter Officers pose for a group image at the Courtland Grand Hotel in Atlanta, GA, during the 117th Tau Beta Pi Convention.

Tricia Gomulinski presents president Andre Childs and the Central Florida AC with the Engagement with the Community Award.

ALUMNI ACTIVITY: 2023 CONVENTION

Twenty-five ΤΒΠ Alumni Chapter representatives gathered in Atlanta, GA, to conduct Association business, network, and discuss best practices towards strengthening involvement in alumni chapters. In addition, the first **ΤΒΠ Alumni Chapter Awards** were presented at this year's Convention by Director of Alumni Affairs Tricia Gomulinski, including:

Southeastern Michigan Alumni Chapter
Collaboration with Collegiate Chapters
Honorable Mentions – Great Smoky Mountains (TN) and Pittsburgh Alumni Chapters.

Central Florida Alumni Chapter
Engagement with the Community Award

Indianapolis Alumni Chapter
Participation by Members

Indianapolis Alumni Chapter
Most Improved Alumni Chapter
Honorable Mention – Baltimore Alumni Chapter

Milwaukee Area Alumni Chapter
Overall Outstanding Alumni Chapter
Honorable Mentions – Front Range, Indianapolis, and Southeastern Michigan Alumni Chapters

District 7 voting delegates **Irene Garcia Diez,** *MI Q '25*, and **Greg C. Sheets II,** *OH D '22*, stopping by the Alumni Affairs booth.

JOIN AN ALUMNI CHAPTER

Tricia E. Gomulinski, *SD A '98*, Director of Alumni Affairs, works as a software/IT project manager for Teledyne Brown Engineering in Knoxville. Visit: www.tbp.org/?ACcontact or contact t.gomulinski@tbp.org, to discuss the possibility of joining/establishing a chapter near you.

Members of the Central Texas Alumni Chapter pose with a Tesla during their Gigafactory tour.

The Central Jersey Alumni Chapter members after completing the Escape Room challenge.

ALUMNI ACTIVITY:

CENTRAL TEXAS ALUMNI CHAPTER

On August 24, Bill L. Hamm Jr., *NY Z '67*, Central Texas Alumni Chapter president, led a tour of the new Tesla Gigafactory in Austin. Attendees included TX Alpha Chapter Chief Advisor Kara M. Kockelman, Ph.D., P.E., *CA A '91*, several of her students, and the following Central Texas Alumni Chapter members:

M. Consuelo Ortiz, *TX H '89*
Jacob D. Leffler, *UT A '99*
Brian D. Platt, *KS Γ '05*
Roger E. Lachele, *MI Z '75*
Charles H. Allen, *IL A '66*
Philip E Lewis, P.E., *OK A '78*

Serving as Tesla's global headquarters, the facility covers 2,500 acres along the Colorado River with 10+ million square feet of factory floor. Gigafactory Texas is the U.S. manufacturing hub for Model Y and future home of Cybertruck.

If you are interested in learning more about the Central Texas Alumni Chapter, send an email to: *centexTBP@gmail.com*.

ALUMNI ACTIVITY:

CENTRAL JERSEY ALUMNI CHAPTER

The Central Jersey Alumni Chapter gathered in July for lunch and an Escape Room meet up in Edison, New Jersey.

Several majors and occupations were represented and the group worked together utilizing their engineering know-how to break out of the Tiki Room, almost five minutes ahead of schedule.

Individuals in the above image are:

Karen J. Ohland, *PA K '83*
Kevin B. Gallen, P.E, *PA Θ '00*
Abhiram Karuppur, *NJ Δ '19* (President)
Joe S. Perino, *PA Z '88*

The two in front are Kevin's wife and daughter. The chapter looks forward to hosting more fun events with local alumni!

Thanks to Abhiram for submitting this image and summary. Contact the Central Jersey Alumni Chapter at: *CJAlumni@tbp.org*.

ASEE 2023 HALL OF FAME

In celebration of the American Society for Engineering Education's 130th anniversary, 22 individuals and three teams were inducted into its Hall of Fame. This designation honors engineering and engineering technology education standouts whose work has made a significant impact. Eleven of those selected are Tau Bates.

Jenna P. Carpenter, Ph.D., *IN A '83*
Richard M. Felder, Ph.D., *NY H '62*
Adrienne R. Minerick, Ph.D., *MI B '98*
Leah H. Jamieson, Ph.D., *IN A '74*
William C. Oakes, Ph.D., P.E., *IN A '97*
Matthew W. Ohland, Ph.D., *FL A '96*
Paul D. Tougaw, Ph.D., P.E., *IN B '91*
Phillip C. Wankat, Ph.D., *IN A '66*
Bevlee A. Watford, Ph.D., *VA B '81*
Team:
Katy L. Colbry, Ph.D., *MI A '99*
Dirk J. Colbry, Ph.D., *MI A '06*

Executive Council MEETING MINUTES

Summaries from Executive Council (EC) Meetings — October 2022 through December 2022.

October 11, 2022
Virtual

Vice President Rachel Alexander moved to approve the Consent Items as presented and the Council approved on a voice vote.

Engineering Futures Program

- Appoint **Robert C. Styles,** *AL Δ '76*, as an EF Facilitator-in-Training to a term beginning November 1, 2022, and ending June 30, 2023, per request from Katy Colbry.

Advisor Committee

Appoint seven members to terms beginning October 11, 2022, and ending June 30, 2023, 2024, and 2025, per request from Councillor Joan Sciacca.

- **John P. Pederson Jr.,** *GA A '21*
  Advisor to GA Alpha
- **Gregory M. Newcomb,** *CO B '06*
  Advisor to CO Beta
- **Bakhtier Farouk,** *DE A '81*
  Advisor to PA Zeta
- **Susan L. R. Holl,** *CA Λ '76*
  Advisor to CA Upsilon
- **Patrick D. Homen,** *CA Y '85*
  Advisor to CA Upsilon
- **L. Pierre Champagne Jr.,** *LA E '76*
  Advisor to LA Epsilon
- **R. Eugene McGinnis III,** *TN Δ '17*
  Advisor to TN Delta

Reports of Officers and Officials:

President M. Youssef

- Officer Elections will be held at the next EC meeting on November 8.
- An email with committee preferences will be sent out soon.
- The EC was thanked for their work during the Convention.
- A Convention Survey will be distributed by CDG for feedback.
- Ms. Alexander provided an overview of the officer positions.

Secretary M.L. Peterson

- Presented open action items via *Monday.com*

Executive Director Curt Gomulinski

- Sent out Convention debrief survey to the EC
- Continues to address Convention business since the conclusion of the event

Unfinished Business & General Orders:

Appoint installing deputies for chapter installations.

- Mr. Gomulinski presented the schedule of chapter installations of the four new approved societies. The Councillors will provide their availability by the November 8 meeting.

In-person meeting dates

- Dr. M. Youssef noted two upcoming meeting dates for current and new Councillors to plan for. The Council discussed their respective availabilities.
- New Executive Councillor Training on 12/10/22 in Knoxville, TN
- Executive Council Retreat on 1/14/22- 1/15/22 in Orlando, FL

Discussion/Orientation of *Monday.com*

- Mr. Peterson demonstrated *Monday's* capabilities for project and task management to assist the EC, Headquarters, and various committees. He also discussed *Monday's* pricing model.

November 8, 2022
Virtual

Councillor G. Morales moved to approve the Consent Items as presented, and the Council approved the following policies on a voice vote:

- DO29 Trust Investment Policy Manual
- Revision — PG 04 Executive Council Meeting Standing Rules

Reports of Officers and Officials:

President M. Youssef

- Reported on meeting with the president of the Intellectual Property Law Association to discuss potentially partnering with them to market their fellowships for law school to ΤΒΠ students. Dr. Youssef will work with ΤΒΠ officials to set up a meeting to see if this is something we would like to pursue.

Vice President R. Alexander

- Provided her desired vision for the Executive Council in 2023 with a focus on strategic goals, leadership, and importance of volunteers.

Secretary M.L. Peterson

- Presented on the continued efforts to integrate ΤΒΠ's task management into *Monday.com*.
- Reviewed the Executive Council's open action items

Special Orders:

- Election of Executive Council Officers for 2023
  - Vice President
    - Without Objection, Ron Hickling was elected Vice President by acclamation.
  - Secretary
    - Without Objection, Mike Peterson was elected Secretary by acclamation.
  - Treasurer
    - Without Objection, Mike Hand was elected Treasurer by acclamation.

Unfinished Business & General Orders:

- Appoint installing deputies for chapter installations
  - Councillor G. Youssef moved that Dr. M. Youssef serve as the installing deputy for Georgia Delta with Councillor Marla Peterson as backup; Ms. Alexander serve as the installing deputy for Tennessee Eta with Councillor Mike Hand as backup; Mr. Youssef serve as the installing deputy for North Carolina Eta with Mr. Peterson as backup; and Mr. Hickling serve as the installing deputy for Massachusetts Kappa with Dr. Youssef as backup.
  - The Council approved the installation deputies on a voice vote.

New Business:

- Tau Beta Pi Standing Committees Proposal
  - Mr. Hand presented his proposed restructuring of the Association committees and the Council provided feedback to the initial overview. Mr. Hand recommended a task force be established to help establish the proposed committees and draft charters.

November 8, 2022 (Continued)
Virtual

- District Conference Attendance Planning
  - Councillor Pierce moved that the Executive Council have a member of the Council, a Program Director, or a member of the HQ Team attend each of the 2023 District Conferences. The Council approved on a voice vote.
  - The Council will provide their conference availabilities by November 15, 2022.

December 13, 2022
Virtual

Councillor Pierce moved to approve the Consent Items, as amended, and the Council approved the following on a voice vote.

- Policy & Document Review
  - D120 Association President
  - D121 Association Vice President
  - D122 Advisor's Manual
  - D123 NEST Charter

Reports of Officers and Officials:

President M. Youssef

- Thanked the Councillors for their service throughout the year and Mr. Pierce and Mr. Morales for their time on the Council.

Vice President R. Alexander

- Thanked the Councillors who assisted with collection of reports from their respective committees and task forces. Ms. Alexander will follow up with those that are outstanding.
- Confirmed a successful onboarding meeting for the incoming Councillors over the weekend.
- The Executive Council onboarding manual will be sent out for review.

Secretary M.L. Peterson

- Presented the process for how the Council will utilize *Monday.com* going forward to track open and closed action items.

Executive Director Curt Gomulinski

- Presented his report of current and pending responsibilities.
- The updated Association Officials Directory was presented.

Reports of Boards, Committees, and Task Forces

- The Council received reports from the following committees:
  - Advisors Committee
  - Convention Program Planning Committee
  - Finance Committee
  - Membership Committee
  - Program Support Committee

Unfinished Business & General Orders:

District Conferences
Mr. Pierce moved that the Council representatives for the 2023 District Conferences be:

- Rachel Alexander for D15 and D2 or D5
- Mike Hand for D9
- Ron Hickling for D16
- Ming Lin for D1
- Mike Peterson for D7
- Marla Peterson for D10 and D13
- Joan Sciacca for D12 and D14
- George Youssef for D4 and D8
- Menna Youssef for D3 and D2 or D5
- Alex Cross for D2 or D5
- Curt Gomulinski for D11

The Council approved the representatives on a voice vote.

Albuquerque

- Mr. Gomulinski presented his inspection report from his recent trip to Albuquerque.
- Dr. M. Youssef moved that the proposal to host the 2025 Convention in Albuquerque, NM, be accepted and the Executive Director sign the necessary contracts to book the Convention.
- The Council approved the proposal on a voice vote.

New Business:

Revision — CT 03 General Revision Phase 2 Review Task Force

- Dr. M. Youssef moved to amend the charter to change "The task force members shall meet weekly" to "The task force members shall meet periodically." The Council approved the amendment.
- Mr. Peterson moved to remove "The task force shall not rewrite any portion of the Bylaws of Tau Beta Pi but may recommend minor wording changes, as appropriate." The Council approved the amendment.
- Dr. M. Youssef moved to approve CT 03 General Revision Phase 2 Review Task Force as amended, and the Council approved on a voice vote.

Committee Proposal Discussion

- The Executive Council will review the proposal further in January.

WE NEED YOU AS A DISTRICT DIRECTOR

Are you interested in taking a more active volunteer role in the Association? Currently, seven ΤΒΠ districts are looking for new District Directors! Find the job description at: *www.tbp.org/?DDjob*

Candidates should be located near:

D1 - Connecticut or Rhode Island

D7 - Cleveland or Eastern Ohio

D9 - Oklahoma or Arkansas

D10 - Houston or Southern Texas

D12 - Southern Idaho or Southwestern Montana

D15 - Sacramento

D16 - Los Angeles

If you are interested, contact Stacey Forkner, Director of the District Program at: *s.forkner@tbp.org*

DISTRICT 9
Join
Matt Romero, *MS A '20*

DISTRICT 12
Join
Natalie England, *LA A '08*

ALUMNI NOTES

Your fellow Tau Bates are interested in news about **you.**

CALIFORNIA GAMMA '06

Andrew J. Hendel

Andrew is CEO of QuickPenny, a payment and loyalty rewards app and recently created Marshmallo to be the safest dating app in the world. He has B.S. and M.S. degrees in management science & engineering from Stanford Univ. and was previously a managing director at Beach Point Capital hedge fund.

FLORIDA ALPHA '96

Jenna R. Jambeck Ph.D.

Jenna was recognized as a 2023 Women of the Year state honoree by *USA Today*. She is a Distinguished Professor at the University of Georgia and cited for being a "connoisseur of the discarded" and 2022 MacArthur Genius Grant recipient for "her work on marine debris shaping the global research on plastic pollution."

FLORIDA IOTA '21

Wanjiku Kanjumba

Wanjiku, Kenyan-born, is CEO and chairwoman of Vicillion, "a global infrastructure development firm poised to launch an unparalleled spaceport for commercial use." She recently started a half-billion aerospace fund focused on "transforming the aerospace landscape." Her degrees are from Embry-Riddle Aero. Univ. (FL).

IDAHO ALPHA '97

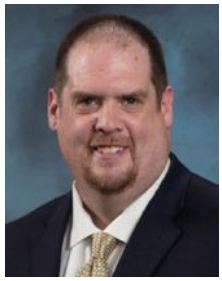
Michael G. Woodworth P.E.

Michael has rejoined STRATA Inc., as a senior geotechnical engineer. He has 24 years of experience in the civil & geotechnical eng'g field, previously worked for STRATA from 2006-16 as a project engineer overseeing the energy service division, and has a geological eng'g B.S. degree from the University of Idaho.

INDIANA EPSILON '07

Jennifer L. Sharkey P.E.

Jennifer was honored with the Trine University Distinguished Service Award. She graduated with a civil engineering degree, captained the women's soccer team, and was a leader in several honor societies. She currently serves as lead research engineer for Purdue University's Indiana Local Technical Assistance Program and is an assistant women's soccer coach at Trine.



KANSAS GAMMA '95

Jeremy T. Busby Ph.D.

Jeremy was named associate laboratory director for the Fusion and Fission Energy and Science Directorate at ORNL. He joined ORNL in 2004 and has served in several leadership roles there, most recently as director of the Nuclear Energy and Fuel Cycle Division. Jeremy is also an adjunct professor at the Univ. of Michigan.

NEW YORK OMICRON '15

Morgan DiCarlo Ph.D., P.E.

Morgan was selected as a member of the 51st class of the AAAS Science & Technology Policy Fellowships program. She will serve as a translational science and climate change research fellow in the Office of Research and Development. Her civil eng'g B.S. & Ph.D. degrees are from Stony Brook Univ. and NC State, respectively.

PENNSYLVANIA ZETA '82

Chuck E. Baukal Jr. Ph.D., P.E.

Chuck retired from industry after 42 years to take a new position as the Founding Director of Engineering at Oklahoma Baptist Univ. in Shawnee. The initial majors will include electrical and mechanical eng'g, with the first classes starting this fall semester. He has a Ph.D. in mechanical eng'g from the Univ. of Pennsylvania.

SOUTH CAROLINA GAMMA '99

Melvin C. Williams F.SAME

Melvin was named the 2023 Engineer of the Year by the American Council of Engineering Companies of South Carolina, was recently awarded the Civil Engineers Joint Council's Engineer of the Year Award, and inducted into The Citadel's Academy of Engineers at his alma mater. He is VP and senior client development manager at Terracon.

WASHINGTON BETA '82

Tim D. Fife

Tim retired after 40 years of public works in Grant, Franklin, and Lewis counties. Most recently, he served as county engineer of Lewis County in Washington, where he oversaw the quality construction and maintenance of 1,042 miles of road and performed oversight on drainage and diking districts as well. His B.S. degree is from Washington State Univ.

Send news about promotions, honors, civic activities, weddings, etc. to Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697 or to tbp.media@tbp.org. Deadlines: February 1 for **Spring** issue and May 1 for **Summer** issue. Include a recent head shot, name, address, chapter/class year, and email address or phone number. We cannot accept graduation announcements. Thank you!

University of Maryland Search and Rescue Drone Team Honored

U.S. Representative Glenn F. Ivey (D-MD) presented members of the University of Maryland (UMD) Autonomous Micro Air Vehicle (AMAV) team with a proclamation during a special ceremony held at the Maryland Fire and Rescue Institute to commemorate their first place finish —the team's second successive win— in a NIST challenge. The team built an innovative search and rescue drone that took home the top prize, and a cash award of $150,000, in the National Institute of Standards and Technology (NIST) First Responders UAS Indoor Challenge this year. "It's like winning the Super Bowl two times in a row," Ivey said of the feat, which saw the UMD students compete against competitors that included teams from private industry as well as other academic institutions. Team leaders were on hand to demo the capabilities of the drone they call Gambit, flying it inside a facility used to train firefighters. Gambit was designed to be easy for anyone to operate, said team advisor **Derek A. Paley, Ph.D.,** *CT A '97*, who is director of the Maryland Robotics Center and professor of aerospace engineering education at UMD. "It uses features in the environment to stabilize the flight and send 4K video through the structure. Firefighters and first responders can remain outside the structure and get this high resolution feed of the interior," he said.

Image above: the Gambit drone built by the UMD Autonomous Micro Air Vehicle team.

Image (left to right): UMD President Darryll J. Pines, Ph.D., *MD B '86*; AMAV team lead Animesh Shastry; AMAV team design lead and pilot Qingwen Wei; U.S. Representative Glenn F. Ivey; Maryland Robotics Center Director Derek A. Paley, Ph.D., *CT A '97*; UMD UAS Research and Operations Center Project Engineer Josh Gaus; and UMD School of Engineering Dean Samuel Graham Jr., Ph.D., *FL H '93.*

Member Spotlight


Fujimoto


Huang


Swanson

The 2023 Lasker~DeBakey Clinical Medical Research Award honors **James G. Fujimoto, Ph.D.,** *MA B '79*, **David Huang, M.D., Ph.D.,** *MA B '85*, and **Eric A. Swanson,** *MA Z '82*, for the invention of optical coherence tomography (OCT), a technology that revolutionized ophthalmology — allowing rapid detection of diseases of the retina that impair vision. "This technology uses light beams to visualize microscopic structures within tissues of the body such as the retina.

The ability to painlessly generate high-resolution cross-sectional images of the eye's internal architecture in real time and without physical contact was unprecedented, and OCT revolutionized ophthalmology by allowing doctors to detect and treat diseases of the retina, thereby saving the eyesight of millions. OCT's medical use is now expanding, because engineers have incorporated it into probes that can enter the circulatory system and integrated it into surgical microscopes and other instruments."

Dr. Fujimoto is a professor and principal investigator in the Research Laboratory of Electronics at Massachusetts Institute of Technology. Dr. Huang is a professor and associate director & director of research of the Casey Eye Institute in the School of Medicine at the Oregon Health & Science University. Mr. Swanson is an affiliate of the Research Lab of Electronics at MIT and member of the Board of Directors at NinePoint Medical, Curata.

2024 DISTRICT CONFERENCE SCHEDULE

District 1: *April 13-14*
MA Epsilon – Boston

District 2: *April 6-7*
NY Tau – Binghamton

District 3: *Feb. 9-10*
DE Alpha – Newark

District 4: *April 6*
MD Beta – College Park

District 5: *Feb. 3-4*
SC Beta – Columbia

District 6: *Feb. 16-17*
MS Beta – Oxford

District 7: *April 5-6*
OH Theta – Dayton

District 8: *April 13-14*
IN Alpha – W. Lafayette

District 9: *Feb. 24*
MO Epsilon – St. Louis

District 10: *Feb. 23-25*
TX Xi – Dallas

District 11: *April 12-13*
MN Beta – Duluth

District 12: *Feb. 23-24*
CO Delta – Ft. Collins

District 13: *April 13*
NM Alpha – Las Cruces

District 14: *Feb. 17-18*
WA Alpha – Seattle

District 15: *March 9*
CA Alpha – Berkeley

District 16: *Feb. 24-25*
CA Epsilon – Los Angeles

Note: Conference dates are subject to change.
For the latest information, check our website at:
www.tbp.org/off/districtConference.cfm

Member Change of Address

Be sure to keep your email and mailing addresses current in our system so you don't miss any issues of *The Bent*!

Updated information can be sent to ***tbp.memberupdate@tbp.org.*** Please include your name, initiating chapter, class (year of graduation), and any preferred name changes as well.

THE BENEFITS OF MEMBERSHIP

See the complete list at: **www.tbp.org/memb/benefits.cfm**

DELL: Discount program on Dell branded personal products, electronics, and accessories.

LINKEDIN: Join 35,100 members in our official group for professional networking and career discussions (search: Tau Beta Pi Engineering Honor Society).

CIVIL SERVICE: Receive automatic entry-level advancement of U.S. Government applicants to GS-7.

LOCAL HOSPITALITY: Access to a worldwide inventory of hotels at exclusively discounted rates.

PPI: 20 percent discount on professional licensing exam review materials (FE/EIT, PE, and more).

TAU BETA PI JOB BOARD: Post a resume online and browse hundreds of engineering jobs at top companies.

Need a Feature from a Back Issue?

You can find previous features from the magazine back to 1979 on our website. One month after each *Bent* is published, the features from that issue are posted in PDF format at: ***www.tbp.org/?Features***

You can reach out to us at ***tbp.media@tbp.org*** with any other requests.

COLLEGIATE CHAPTERS

261 COLLEGIATE CHAPTERS
255 ACTIVE — 633,018 MEMBERS

*6 Inactive chapters shown in **BLUE***

Α = ALPHA
Β = BETA
Γ = GAMMA
Δ = DELTA
Ε = EPSILON
Ζ = ZETA
Η = ETA
Θ = THETA
Ι = IOTA
Κ = KAPPA
Λ = LAMBDA
Μ = MU
Ν = NU
Ξ = XI
Ο = OMICRON
Π = PI
Ρ = RHO
Σ = SIGMA
Τ = TAU
Υ = UPSILON
Φ = PHI
Χ = CHI
Ψ = PSI
Ω = OMEGA

AL ALPHA Auburn University
BETA University of Alabama
GAMMA Univ. of Ala. at Birmingham
DELTA Univ. of Ala. in Huntsville
EPSILON Univ. of South Alabama
AK ALPHA Univ. of Alaska Fairbanks
AZ ALPHA University of Arizona
BETA Arizona State University
GAMMA Northern Arizona University
DELTA Embry-Riddle Univ., Prescott
AR ALPHA University of Arkansas
BETA Univ. of Ark. at Little Rock
CA ALPHA UC Berkeley
BETA Calif. Institute of Technology
GAMMA Stanford University
DELTA University of Southern Calif.
EPSILON UC Los Angeles
ZETA Santa Clara University
ETA San Jose State University
THETA Calif. State Univ., Long Beach
IOTA Calif. State Univ., Los Angeles
KAPPA Calif. State Univ., Northridge
LAMBDA UC Davis
MU Calif. Poly St. Univ., San Luis Obispo
NU Calif. State Poly Univ., Pomona
XI San Diego State University
OMICRON Loyola Marymount Univ.
PI Northrop University (inactive)
RHO California State Univ., Fresno
SIGMA UC Santa Barbara
TAU University of California, Irvine
UPSILON Calif. St. Univ., Sacramento
PHI University of the Pacific
CHI California State Univ., Fullerton
PSI UC San Diego
OMEGA Harvey Mudd College
ALPHA ALPHA Calif. St. Univ., Chico
ALPHA BETA UC Riverside
ALPHA GAMMA San Francisco St. Univ.
ALPHA DELTA UC Santa Cruz
ALPHA EPSILON Univ. of San Diego
CO ALPHA Colorado School of Mines
BETA Univ. of Colorado at Boulder
GAMMA University of Denver
DELTA Colorado State University
EPSILON Univ. of Colorado at Denver
ZETA U.S. Air Force Academy
CT ALPHA Yale University
BETA University of Connecticut
GAMMA University of Hartford
DE ALPHA University of Delaware
DC ALPHA Howard University
BETA Catholic Univ. of America
GAMMA George Washington Univ.
FL ALPHA University of Florida
BETA University of Miami
GAMMA University of South Florida
DELTA University of Central Florida
EPSILON Florida Atlantic University
ZETA Florida Institute of Technology
ETA FL A&M Univ.-FL State Univ.
THETA Florida International Univ.
IOTA Embry-Riddle Aero. Univ.
GA ALPHA Georgia Institute of Technology
BETA Mercer University
GAMMA Georgia Southern Univ.
DELTA University of Georgia
ID ALPHA University of Idaho
BETA Idaho State University
GAMMA Boise State University
DELTA Brigham Young Univ.-Idaho
IL ALPHA Univ. of IL at Urbana-Champaign
BETA Illinois Institute of Technology
GAMMA Northwestern University
DELTA Bradley University
EPSILON S. Illinois Univ. at Carbondale
ZETA University of Illinois at Chicago
IN ALPHA Purdue University
BETA Rose-Hulman Inst. of Technology
GAMMA University of Notre Dame
DELTA Valparaiso University
EPSILON Trine University
ZETA Indiana Univ.-Purdue Univ. Indpls.
IA ALPHA Iowa State University
BETA University of Iowa
KS ALPHA University of Kansas
BETA Wichita State University
GAMMA Kansas State University
KY ALPHA University of Kentucky
BETA University of Louisville
GAMMA Western Kentucky University
LA ALPHA Louisiana State University
BETA Tulane University
GAMMA Louisiana Tech. University
DELTA Univ. of Louisiana at Lafayette
EPSILON University of New Orleans
ME ALPHA University of Maine
MD ALPHA Johns Hopkins Univ.
BETA University of Maryland
GAMMA U.S. Naval Academy
DELTA Univ. of Maryland Baltimore Co.
EPSILON Morgan State University
MA ALPHA Worcester Polytechnic Inst.
BETA Massachusetts Inst. of Tech.
GAMMA Harvard University (inactive)
DELTA Tufts University
EPSILON Northeastern University
ZETA University of Mass. at Amherst
ETA Boston University
THETA Univ. of Massachusetts Lowell
IOTA Western New England Univ.
KAPPA Merrimack College
MI ALPHA Michigan State University
BETA Michigan Technological Univ.
GAMMA University of Michigan
DELTA University of Detroit Mercy
EPSILON Wayne State University
ZETA Kettering University
ETA Lawrence Technological Univ.
THETA Oakland University
IOTA Univ. of Michigan-Dearborn
KAPPA Western Michigan Univ.
LAMBDA Grand Valley State Univ.
MN ALPHA Univ. of Minnesota-Twin Cities
BETA Univ. of Minnesota, Duluth
MS ALPHA Mississippi State University
BETA University of Mississippi
MO ALPHA Univ. of Missouri-Columbia
BETA Missouri Univ. of Science & Tech.
GAMMA Washington University
DELTA Univ. of Missouri-Kansas City
EPSILON Saint Louis University
MT ALPHA Montana State University
BETA Montana Tech. of the Univ. of MT
NE ALPHA Univ. of Nebraska-Lincoln
NV ALPHA University of Nevada, Reno
BETA Univ. of Nevada, Las Vegas
NH ALPHA Univ. of New Hampshire
BETA Dartmouth College
NJ ALPHA Stevens Institute of Technology
BETA Rutgers University
GAMMA New Jersey Inst. of Tech.
DELTA Princeton University
EPSILON Rowan University
ZETA The College of New Jersey
NM ALPHA New Mexico State University
BETA University of New Mexico
GAMMA NM Inst. of Mining & Tech.
NY ALPHA Columbia University
BETA Syracuse University
GAMMA Rensselaer Polytechnic Inst.
DELTA Cornell University
EPSILON New York Univ. (inactive)
ZETA Brooklyn Polytechnic (inactive)
ETA City College of CUNY
THETA Clarkson University
IOTA Cooper Union School of Eng'g.
KAPPA University of Rochester
LAMBDA Pratt Institute (inactive)
MU Union College
NU SUNY at Buffalo
XI Manhattan College
OMICRON SUNY at Stony Brook
PI Rochester Institute of Tech.
RHO NYU Tandon School of Eng'g.
SIGMA Alfred University
TAU Binghamton University
UPSILON U.S. Military Academy
NC ALPHA North Carolina State Univ.
BETA Univ. of North Carolina (inactive)
GAMMA Duke University
DELTA Univ. of NC at Charlotte
EPSILON NC A&T State University
ZETA East Carolina University
ETA Western Carolina University
ND ALPHA North Dakota State University
BETA University of North Dakota
OH ALPHA Case Western Reserve Univ.
BETA University of Cincinnati
GAMMA Ohio State University
DELTA Ohio University
EPSILON Cleveland State Univ.
ZETA University of Toledo
ETA Air Force Institute of Tech.
THETA University of Dayton
IOTA Ohio Northern University
KAPPA University of Akron
LAMBDA Youngstown State Univ.
MU Wright State University
NU Cedarville University
XI Miami University
OK ALPHA University of Oklahoma
BETA University of Tulsa
GAMMA Oklahoma State University
OR ALPHA Oregon State University
BETA Portland State University
GAMMA University of Portland
DELTA Oregon Institute of Tech.
PA ALPHA Lehigh University
BETA Pennsylvania State University
GAMMA Carnegie Mellon University
DELTA University of Pennsylvania
EPSILON Lafayette College
ZETA Drexel University
ETA Bucknell University
THETA Villanova University
IOTA Widener University
KAPPA Swarthmore College
LAMBDA University of Pittsburgh
MU Penn State Erie, Behrend College
PR ALPHA University of Puerto Rico
RI ALPHA Brown University
BETA University of Rhode Island
SC ALPHA Clemson University
BETA University of South Carolina
GAMMA The Citadel
SD ALPHA S. Dakota Sch. of Mines & Tech.
BETA South Dakota State University
TN ALPHA University of Tennessee
BETA Vanderbilt University
GAMMA Tennessee Tech. University
DELTA Christian Brothers Univ.
EPSILON University of Memphis
ZETA Univ. of Tenn. at Chattanooga
ETA Lipscomb University
TX ALPHA University of Texas at Austin
BETA Texas Tech. University
GAMMA Rice University
DELTA Texas A&M University
EPSILON University of Houston
ZETA Lamar University
ETA Univ. of Texas at Arlington
THETA Univ. of Texas at El Paso
IOTA Southern Methodist University
KAPPA Prairie View A&M University
LAMBDA Texas A&M Univ.-Kingsville
MU Univ. of Texas at San Antonio
NU Univ. of Texas Rio Grande Valley
XI University of Texas at Dallas
UT ALPHA University of Utah
BETA Brigham Young University
GAMMA Utah State University
VT ALPHA University of Vermont
BETA Norwich University
VA ALPHA University of Virginia
BETA Virginia Poly. Inst. & State Univ.
GAMMA Old Dominion University
DELTA Virginia Military Institute
EPSILON Virginia Commonwealth Univ.
WA ALPHA University of Washington
BETA Washington State University
GAMMA Seattle University
DELTA Gonzaga University
WV ALPHA West Virginia University
BETA West Virginia Univ. Inst. of Tech.
WI ALPHA Univ. of Wisconsin-Madison
BETA Marquette University
GAMMA Univ. of Wlisconsin-Milwaukee
DELTA Milwaukee School of Eng'g.
EPSILON Univ. of Wisconsin-Platteville
WY ALPHA University of Wyoming

ALUMNI CHAPTERS

81 ALUMNI CHAPTERS
50 ACTIVE

*31 Inactive chapters shown in **BLUE***

DISTRICT 1
Central CT, Hartford
Greater Boston Area, MA

DISTRICT 2
Buffalo, NY
Central Jersey, NJ
Long Island Suburban, NY
Newark, NJ
New York City, NY
New York Capital District, NY
Rochester, NY
Southern Tier, Binghamton, NY

DISTRICT 3
Lehigh Valley, Bethlehem, PA
Philadelphia, PA
Pittsburgh, PA
Wilmington, DE

DISTRICT 4
Baltimore, MD
Charlotte, NC
Hampton Roads, Newport News, VA
Kanawha Valley, Charleston, WV
Research Triangle, Durham-Chapel Hill-Raleigh, NC
Richmond, VA
Washington, DC

DISTRICT 5
Atlanta, GA
Central FL, Orlando
Daytona Beach, FL
Gainesville, FL
Miami, FL
Midlands, Columbia, SC
Palm Beach/ Broward, FL
Piedmont, Clemson, SC
Puerto Rico
Southwest FL
Tampa Bay, FL

DISTRICT 6
Bluegrass, Lexington-Frankfort, KY
Central Alabama, Birmingham
Great Smoky Mountains, Knoxville-Oak Ridge, TN
Greater Gulf Coast, Mobile, AL
Louisville, KY
Mid-South, Memphis, TN
Rocket City, Huntsville, AL

DISTRICT 7
Ann Arbor Area, MI
Central MI, Lansing
Cincinnati, OH
Columbus, OH
Dayton, OH
Flint, MI
Ohio's North Coast, Cleveland
SE Michigan, Detroit
West Michigan, Grand Rapids

DISTRICT 8
Chicago Area, IL
Central Illinois, Urbana-Champaign
Indianapolis, IN
Milwaukee Area, WI

DISTRICT 9
Kansas City, KS
Pioneer, OK
Rolla, MO
St. Louis, MO

DISTRICT 10
Central Texas, Austin/San Antonio
North Texas, Dallas-Fort Worth
Greater New Orleans, LA
Texas Gulf Coast, Houston

DISTRICT 11
Ames, IA
Minnesota, Twin Cities, MN

DISTRICT 12
Pikes Peak, CO
Front Range, CO/WY
Salt Lake City, UT
Treasure Valley, Boise, ID

DISTRICT 13
Albuquerque, NM
El Paso, TX
Phoenix, AZ
Sun City, AZ
Tucson, AZ

DISTRICT 14
Columbia River Basin, Richland, WA
Portland, OR
Puget Sound, Seattle, WA

DISTRICT 15
Sacramento Vly, CA
SF Bay Area, CA
SF Peninsula, Palo Alto, CA

DISTRICT 16
Los Angeles, CA
Orange County, CA
Greater San Diego, California
Southern California

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