



**2026 Meeting of the TAAPT**  
**University of Tennessee at Chattanooga**  
**Friday, March 27, and Saturday, March 28**

<https://taapt.org/>

**Schedule at a Glance**

**Friday, March 27**

2:00 pm – 2:30 pm	<b>Check-in and registration for the EPB/Quantum Node Lab Tour participants</b> – Grote Hall, 1 <sup>st</sup> floor
2:30 pm - 3:00 pm	Travel to EPB by UTC vans
3:00 pm - 5:00 pm	EPB/ UTC Quantum Node Lab Tour
5:30 pm to 6:00 pm	<b>Check-in and registration</b> – LUPT 120
6:00 pm to 7:00 pm	Welcoming Remarks (Dr. Keenan Dungey, Chair, Department of Physics and Astronomy) and Dinner - LUPT 120
7:00 pm to 8:00 pm	Keynote Speaker, Dr. Tian Li, "Quantum Connectivity for Scale in Chattanooga." - LUPT 120

**Parking for EPB tour participants will be provided for the parking lot #12 (under Lupton Hall).** Parking after 5 pm is **free**. Suggested parking lots are #12 (under Lupton Hall) or #10 (next to Grote Hall). UTC map: <https://explore.utc.edu/?id=1826#!s/>

**Saturday, March 28 – Tennessee Room, University Center**

**Parking** on Saturday is free. Suggested parking lots are #12 (under Lupton Hall) or #10 (next to Grote Hall)

8:00 am to 8:55 am	Registration/ light breakfast
8:55 am to 9:00 am	Welcoming Remarks (Dr. Tatiana Allen, 2025-2026 TAAPT President)
9:00 am to 11:00 am	Oral presentations
11:00 am to 11:15 am	Break/poster setup
11:15 am to 11:45 pm	Business meeting/poster setup
11:45 pm to 12:30 pm	Poster session
12:30 pm to 1:30 pm	Lunch at the Crossroads
1:30 pm to 1:45 pm	Poster prizes
1:45 pm to 3:00 pm	Quantum Sensing Lab tour, SPS Projects Workshop - Grote Hall
1:45 pm to 3:30 pm	UTC Clarence T. Jones Observatory Tour

# Conference Program for Saturday, March 28

## Tennessee Room, University Center

**8:00 – 8:55**      **Registration/light breakfast**

**8:55 – 9:00**      **Welcome Remarks, Dr. Tatiana Allen, 2025-2026 TAAAPT President**

**9:00 – 11:00**      **ORAL PRESENTATIONS**

**9:00 – 9:15**      **Ryen Lapham** (*Chattanooga State Community College*)

### **Revitalizing Online Physics**

Navigating online classes can be difficult for students, especially science courses for non-majors. To improve student success in online algebra-based physics, we implemented several new changes. The traditional reading assignments were replaced by scrollable, interactive Articulate Rise 360 presentations. Activities were created to help students understand how to properly use AI to work through common misconceptions. Lab grades improved from 76.6 to 82.6 ( $p = 0.034$ ), and the number of students scoring zeroes dropped from 17.09% to 7.23% ( $p = 0.00011$ ).

Acknowledgement: Chattanooga State Departmental Funds

**9:15 – 9:30**      **Krista McBride** (*Belmont University*)

### **Using Journal Articles on Sports to Introduce Scientific Literacy in a Physics Course**

This presentation describes the use of sports-focused biomechanics journal assignments to help students connect core physics concepts with real-world applications. Students engage with peer-reviewed articles that apply fundamental principles like rotational motion and energy to athletic performance. This session outlines strategies for selecting articles and structuring assignments.

Reference: McBride, Krista K. "Using Journal Articles of Sport to Introduce Scientific Literacy in a Physics Course." *The Physics Teacher*, 2026, 64, 208-210.

**9:30 – 9:45**      **Steve Robinson** (*Belmont University*)

### **An Interactive Bike Wheel Lab**

A popular physics demonstration involves a spinning bicycle wheel precessing around a rope. We propose extending this demonstration to a full low-cost lab in an introductory course with class discussion, measurements, predictions, and a GlowScript programming element.

Reference: S. J. Robinson, "Connecting the mathematical and conceptual views of angular momentum," *Physics Education* 44 (2), 144–148 (2014).

- 9:45– 10:00**    **Geoffrey Burks** (*Tennessee State University*)  
**An Experiment with an AI Bot to Tutor Mechanics**  
I created "MechanicsTutorBot" in Poe.com to help students with homework during evenings and weekends. The bot coaches students on problem-solving strategies. Preliminary student feedback indicates the tool is useful; further data is being collected to measure changes in exam scores.
- 10:00 – 10:15**    **Nat Smith** (*Middle Tennessee State University*)  
**Excelling With Excel**  
While many departments have moved toward specialized software like Logger Pro, the ubiquity of Excel makes it a vital skill. This presentation discusses the LINEST function for finding uncertainty in linear best-fit lines and how Excel is being integrated into introductory astronomy labs.
- 10:15 – 10:30**    **W. Blake Laing, Kole Lopez** (*Southern Adventist University*)  
**Motion Analysis Las for High School using Smartphone Video Analysis**  
We present a method for analyzing motion using FizziQ, a free smartphone app that transforms personal devices into data collection tools for chronophotography and real-time graphing of velocity and energy.
- 10:30 – 10:45**    **Geoffrey Poore** (*Union University*)  
**PhysEq: Generating Randomized Introductory Physics Problems with Solutions using Python**  
PhysEq is a free, open-source Python library for automatically generating physics problems with realistic parameters and complete, step-by-step solutions. It builds on the SymPy computer algebra system and preserves expression order for readability.
- 10:45 – 11:00**    **Tatiana Allen**, (*University of TN at Chattanooga*)  
**Math Kangaroo in the state of Tennessee**  
Math Kangaroo ([mathkangaroo.org](http://mathkangaroo.org)) is an annual international mathematics competition for students in grades 1–12, engaging over 7 million participants worldwide. In 2026, more than 60,000 students across the United States participated, with numbers growing by about 20% annually. More than a test, Math Kangaroo celebrates logical thinking and problem-solving through creative word problems, puzzles, and geometry.
- In Tennessee, our mission is to expand access to enriching math experiences by giving every student the opportunity to participate. The competition offers flexible formats, including in-person and remote options. Tennessee students consistently achieve strong results, earning state and national recognition.
- Despite recent growth, many areas of the state remain underserved. We seek partnerships with universities, educators, and community leaders to expand access. Establishing a local center is a simple, impactful way to bring high-quality math opportunities to students and foster lasting enthusiasm for mathematics.

- 11:00 -11:15 Break/poster setup**
- 11:15 -11:45 Business meeting/poster setup**
- 11:45 -12:30 Poster session – see below**
- 12:30-1:30 Lunch at the Crossroads**
- 1:30 – 1:45 Poster prizes and closing remarks**
- 1:45 - 3:00 Quantum Sensing Lab tour (Grote Hall 230), SPS Projects Workshop (Grote Hall 213)**
- 1:45 - 3:30 UTC Clarence T. Jones Observatory Tour  
(10 N Tuxedo Ave, Chattanooga, TN 37411)**

## Poster Presentations

### 1. Sb/Bi-based Phase Change Memory Materials with Fast High-to-Low Ohmic State Switching

**Nikoli Sheffield**, Roman Golovchak, Yuriy Holovchak, Andriy Kovalskiy  
(*Austin Peay State University*)

This work studied the temperature dependence of thin-film DC conductivity in the Ge-Sb-S-Se-Te family. A threshold temperature was found where resistance changed abruptly by 6 orders of magnitude. This switch has significant potential for AI accelerators and reconfigurable systems.

Acknowledgement: Student Research Innovation

Reference: Roman Golovchak, *Phase-change materials based on amorphous equichalcogenides*, 2023.

### 2. Analysis of 2024 Cold Beam Neutron-Mirror Neutron Transformation Experiment

Carolyn Haviland (*University of Tennessee, Knoxville*)

This study analyzes the nn' (neutron to dark matter candidate mirror neutron) transformation experiment performed at the High Flux Isotope Reactor (HFIR). The results set a limit on the theoretical parameters of the mirror matter model.

Acknowledgement: UTK Faculty Research Assistant Fund

### 3. Sweet Nanoscience: Middle Schoolers Learn About the Nanoscale Using Sugar

**Keenan Dungey**, Sandra C. Affare (*University of Tennessee at Chattanooga*)

The simple activity of dissolving sugar crystals of various sizes illustrates the importance of surface-area-to-volume ratios. This activity helps middle school students demonstrate comprehension of size and scale in nanotechnology.

Acknowledgement: USDA NIFA Women and Minorities in STEM, Award #2022-04279.

#### **4. Comparing Six Methods for Determining the Refractive Index of a Glass Prism**

**William Campagna**, Keira Scott, Jair Martinez, Michael Graff, Eugenii U. Donev  
(Austin Peay State University)

We present an update comparing six methods for determining glass prism refractive index dispersion, including minimum deviation and Brewster's angle. The work focuses on accuracy and pedagogical value for undergraduate research.

#### **5. 3-D Printing for Stress Testing in High School Physics**

**Forest (Juney) Shober** (University High, Hamilton County Schools)

High school students design and carry out experimental stress tests on 3D-printed models. The project integrates Newton's Laws with technical skills like "slicing" and infill pattern analysis.

#### **6. Methods of Analyzing the Physical Properties of Topical Analgesic Patches**

**Andrew Elder** (University of Tennessee at Chattanooga)

Understanding the physical properties of topical analgesics is essential for advancing product performance and consumer satisfaction. To support this goal, we collect data on key material characteristics using fundamental principles of physics such as Hooke's Law, tension, and force-distance relationships. These scientific data points reflect the consumer experience and guide product improvements. As a brief overview, topical analgesics are products that are used to target joint, nerve, and muscle pain through active ingredients interacting with the skin, thus the term "topical". The variety of topical analgesics focused on for this research was patches, which have a plastic or cloth backing and a layer of cooling hydrogel that contains our active ingredients. These patches are a key focus for our company as it is believed that an improvement in our formula is vital to staying competitive. We have developed three testing methods for these patches that give valuable insight into the physical properties of new formulations: adhesion, elasticity, and patch removal, using a texture analyzer to evaluate both our products and those of competitors. Texture analyzers are a common instrument in cosmetics in pharmaceutical laboratories, used for measuring textures and physical properties of products. These tests provide valuable insights that enable product comparison and optimization, ultimately enhancing the user experience.

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