

2015 TAAPT Schedule of Events

March 20 – 21, 2015

Austin Peay State University

Friday, March 20, 2015

- 6:00 pm Registration
 APSU Governors Stadium – Club Level Conference Room
 Marion Street, Clarksville, TN 37044
- 6:30 pm Dinner
- 7:30 pm Presentation – Additive Manufacturing: From Rapid Prototyping to Flight
 Dr. Tracie Prater
 Aerospace Engineer
 Materials and Processes Laboratory
 NASA Marshall Space Flight Center in Huntsville, AL

Abstract

NASA Marshall Space Flight Center has over twenty years of research experience in additive manufacturing (AM). Once used only for prototyping purposes, AM technology and techniques have evolved to enable printing of metals and flight hardware. Current research efforts at NASA MSFC focus on both additive manufacturing in-space and for-space. In-space AM encompasses in-space manufacturing technology development programs (such as the 3D printer currently on-board the International Space Station) that will reduce astronaut dependency on earth and enhance crew safety. For-space AM focuses on using AM to produce aerospace grade flight hardware, an area where AM has the potential to reduce part counts and critical welds, improve performance by enabling manufacturing for design, and impart schedule and cost savings. This presentation includes an overview of AM processes and capabilities at NASA MSFC, examples of how NASA utilizes AM to support its current and future programs, and the challenges the aerospace community faces in certifying AM parts for flight.



Saturday, March 21, 2015

8:00 am Registration and Poster Setup – Sunquist Science Complex, Foyer and Room E106.

8:10 am Breakfast
Continental Breakfast – Chartwells

8:25 am Opening Remarks
Dr. Russ Longhurst
Dept. of Physics and Astronomy, Austin Peay State University

8:30 am Presentation - WebAssign / Cengage Learning
Dr. Matt Kohlmyer
Physics Product Manager at WebAssign
Presentation on online tools and teaching resources.

Biography

Matt Kohlmyer received his Ph.D. in physics from Carnegie Mellon University in 2005, specializing in physics educational research. From 2006-2008 he was a Postdoctoral Fellow at Georgia Tech, where he helped to implement educational reforms in the introductory physics curriculum. From 2008-2011 he was a Teaching Assistant Professor at NC State University and served as course coordinator for the calculus-based introductory sequence. Since 2011 he has been the Physics Product Manager at WebAssign, where he oversees the physics product pipeline and works with publishers and instructors to ensure that the product offering meets their needs.

9:30 am Paper Presentation - Electricity and Magnetism: Music to Our Ears.

John Varriano
Christian Brothers University

Abstract

The application of physics principles to musical instruments is another way to make physics fun and exciting for our students. Some basic physics of the electric guitar and the Theremin are discussed. A simple “guitar” made from inexpensive components is demonstrated. A Theremin built from a kit is demonstrated. A concert may follow the presentation if we have some volunteers.

9:50 am Paper Presentation – Factors Contributing to Measuring Errors of Latent Heat of Fusion for Water.

Dr. Pei Xiong-Skiba
Austin Peay State University

10:10 am Paper Presentation – An Educational Perspective on Two-Dimensional Curved Space-Time.

Cahit Erkal
University of Tennessee at Martin

Abstract

We present a pedagogical analysis of a two-dimensional (2D) curved-space, an abstract concept required to learn cosmology. A famous example, a bug walking on a hot plate, is used in “Feynman lectures on physics”, vol. 2, to explain how a 2D space can be curved. We examined this hot-plate problem in detail with an eye toward teaching the concept of curvature of space-time. We hope that this analysis will provide valuable insights in undergraduate teaching.

10:30 am Paper Presentation - QuarkNet, a Research Project for Teachers and Students

Terry King
Austin Peay State University

Abstract

QuarkNet is a project funded in part by the National Science Foundation and the US Department of Energy. The project connects physicists at laboratories and universities with teachers and high school students to set up experiments, collect and analyze data, collaborate with students worldwide, and investigate cutting-edge science. This presentation will highlight my three year involvement with the project including current research.

10:50 am Paper Presentation - Low-cost experiments in optics & material science using candy glass

Dr. Bill Heffner
Lehigh University

Abstract

We present a collection hands-on experiment and home-built apparatus designed to explore physics and “real” glass science through a common and accessible sugar glass also known as hard candy. Experiments are all low-cost and inter-related and include: synthesis, phase diagram, refractive index measurement, nano-carbon fluorescence and crystallization phenomena, as well as apparatus for differential thermal analysis, electrical conductivity and “optical fiber” drawing. Most of the experiments can be assembled in a high school or college lab with minimal cost. The scientific content of these experiments progresses systematically, providing an environment to develop an understanding of glassy materials and participate in the process of scientific inquiry and discovery through experimentation, within a framework of active prolonged engagement.

11:10 am Poster Presentations

Measurement of Planck’s Constant and Determination of Crystal Constant of a NaCl Monocrystal by X-ray Diffraction

Misganaw Getaneh - University of Tennessee at Martin

Photostructural Response of Spin Coated and Thermally Evaporated Chalcogenide Thin Films

Justin Cook - Austin Peay State University

Crystallization kinetics of Novel Glasses for IR photonics

Cameron Johnson - Austin Peay State University

The Latent Heat of Fusion for Water

Tara Skiba - Austin Peay State University

11:30 am Business Meeting

Dr. Russ Longhurst

12:00 pm Lunch

Boxed Lunches – Ham, Turkey, or Club wrap. Includes chips and cookie. - Chartwells.

- 1:00 pm Presentation of the 2015 Outstanding High School Teacher award
Student awards and prizes
- 1:30 pm Workshop – Sweet Experiments in Physics and Optics with Candy Glass
Dr. Bill Heffner
Associate Director
International Materials Institute for Glass
Lehigh University

Abstract

Glass is seldom discussed in our study of matter, yet it is one of the most ubiquitous materials in our everyday life and provides numerous applications in optics, devices and materials. In this workshop we provide an introduction to glass science for the teacher and instructor through a series of low cost experiments with candy glass, a.k.a. hard candy. Experiments will include the making of candy glass, preparing optical fibers, measuring refractive index, exploring polarization and crystallization - all with commonly available materials and minimal cost. The experiments can be tailored for use in the classroom demonstration or student labs from high school to college labs. Additional material will be available on our website at <http://www.lehigh.edu/imi/libraryglassedu.html>