

American Physical Society New England Section Newsletter

Editor

Peter K. LeMaire

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Fall 2017

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**Fall 2017 APS-NES
Meeting
October 20 –21, 2017
University of Rhode Island
Kingston, RI**

Theme: PHYSICS WITH APPLICATIONS IN INDUSTRY

Physics has many overlaps with industry, including medical, material and energy-related applications. The Fall 2017 APS New England Section meeting will have invited talks focused on applications of physics to industry.

Invited speakers

- Dr. Rudolf Tromp – IBM Watson Research Center; Winner of the 2017 APS Distinguished Lectureship Award on the Applications of Physics
- Dr. Cameron Goodwin – Director, Rhode Island Nuclear Science Center
- Dr. Joseph Woicik-[NIST](http://www.nist.gov)
- Dr Ben Young -Rhode Island College
- Dr. Ali Gokirmak, University of Connecticut

For registration, travel and lodging information, and an up-to-date conference schedule, and workshop information, please visit the meeting website at <http://web.uri.edu/physics/apsnes/>

For questions, please send email to

Michael Antosh: mantosh@uri.edu **David Heskett :** dheskett@uri.edu

Recap of the Spring 2017 Meeting at WPI



The Spring 2017 Meeting of the APS New England Sections took place at Worcester Polytechnic Institute in Worcester, MA on April 14-15, 2017.

Friday April 14, 2017

The meeting started with opening remarks by WPI's Research Provost, Bogdan Vernescu.



WPI Research Provost Bogdan Vernescu, giving Opening Remarks

The meeting was held jointly with NanoWorcester. The theme of the meeting was *NanoScience and BioPhysics*. Many disciplines converge in these fields as evidenced by the invited speakers.



Glen Gaudette giving invited talk

This was followed by two informative invited talks by Glen Gaudette, Professor of Biomedical and Bioengineering, WPI, on "*Bioengineering Human Myocardium on Native Extracellular Matrix*", and Suzanne Scarlata, WPI Whit-

Recap of Fall 2016 Meeting...



Suzanne Scarlata, giving invited talk



Charles Schmuttenmaer, giving invited talk



David Weitz, giving invited talk



Larry Bell, giving banquet talk

comb Professor of Chemistry and Biochemistry and President of the Biophysical Society, on *“Using Fluorescence Imaging To Understand How Cells Respond To Their Environment”*. The invited session continued after a short break, with two exciting and engaging talks. The speakers were Charles Schmuttenmaer of the Department of Chemistry, Yale University, on *“Thz Spectroscopy: Studying Carrier Dynamics And Solar Energy Conversion In Nanostructured Materials”*, and David Weitz, of the Physics Department, Harvard University on *“Biology In Picoliter Drops Using Microfluidics”* The invited sessions were chaired by Qi Wen of WPI.

A poster session and dinner banquet followed the opening session. The poster session was chaired by Alan Wuosmaa of the University of Connecticut, and featured a large number of interesting research presentations and discussions. Larry Bell of the Museum of Science Boston spoke following dinner on *“Engaging Public Audiences in Nanoscale Science and Engineering Nationwide”*. Larry discussed an NSF backed effort that started in 2005 that funded the science museum community to engage public audiences nationwide in learning about nanoscale science, engineering, and technology. This highly successful effort helped grow the Nanoscale Informal Science

Recap of Spring 2017 Meeting...

Education Network (NISE Net)

(www.nisenet.org) to have over 600 active partner institutions nationwide and now reach nearly 11 million people each year.

The Friday evening session which chaired by Nancy Burnham of WPI.

Saturday April 15, 2017

The Saturday morning session kept up the interdisciplinary themes with two invited talks. The first talk was by Bryan D. Huey of the Materials Science and Engineering Department, University of Connecticut, and was on “*Nanoscale Properties of Molecular Perovskite Solar Cells*”. The second invited talk of the morning was by Millicent Firestone of the Center for Integrated Nanotechnologies, Los Alamos National Lab and was on “*Cascade Synthesis of Nanoparticle Polymer Composites Exhibiting Emergent Properties*”. The Saturday invited session was chaired by Izabela Stroe of WPI.



Millicent Firestone, giving invited talk

Following the invited session, the meeting continued with a number of parallel contributed sessions. The contributed sessions were: *Applied Physics and Physics History*, chaired Richard Price, of the Massachusetts Institute of Technology, *Computational Methods* chaired by Nima Rahbar of Worcester Polytechnic Institute, *Biophysics* chaired by Erkan Tuzel of Worcester Pol-



Bryan D. Huey, giving invited talk

technic Institute, *Experiment and Instrumentation* chaired by Bryan Huey of the University of Connecticut, and *Nanomaterials and Nanoparticles* chaired by Gang Han of UMass Medical School. In addition to the invited talks, there were 24 contributed talks and 40 contributed posters in the Friday evening session.

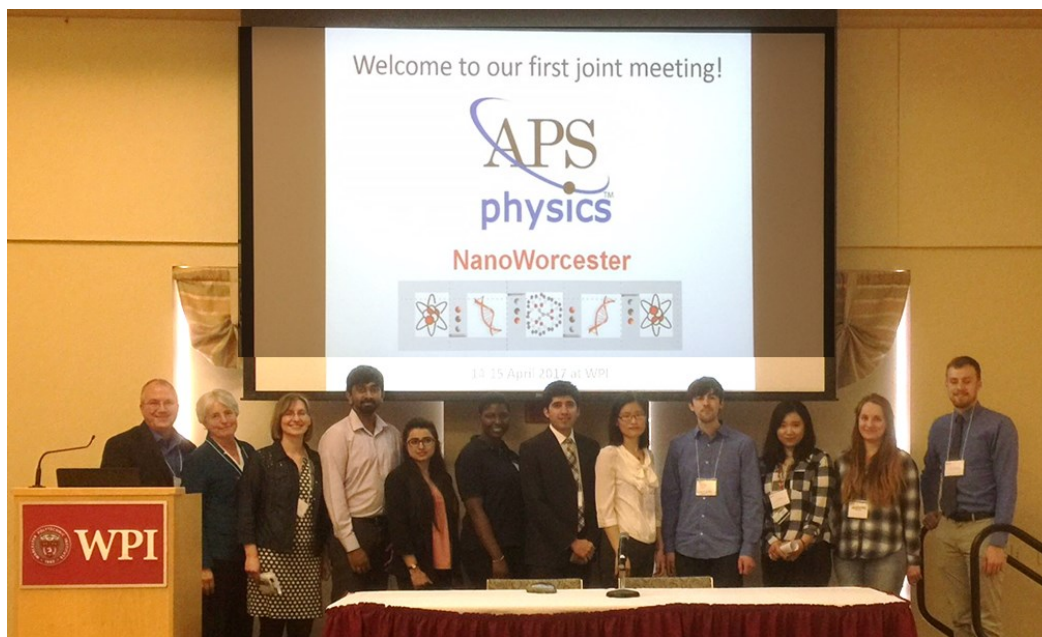
Students who selected the option at registration participated in a poster and elevator-pitch competition. Based on an initial round of judging during the poster presentations, finalists at several levels (PhD, MS, and undergraduate) were notified following Friday's banquet that they were selected to compete in an “Elevator Pitch” competition that followed the parallel sessions on Saturday. Following the elevator pitches, judges selected winners in each category and cash prizes that totaled \$1,700 were awarded. These funds were raised by NanoWorcester and the industrial sponsors included SPECS Inc., Micro Video Instruments, Inc., Molecular VISTA, ANASYS Instruments, Aramco, and the Boston Museum of Science. The poster/elevator-pitch competition winners were:

PhD Students:

1st Place:

Sina Askarinejad, Worcester Polytechnic Institute, “*Nacre's strategy to enhance mechanical and fracture properties*”

Recap of Spring 2017 Meeting...



Poster and elevator-pitch award winners

Nelaka Govinna, Tufts University, *“Structure and properties of superhydrophobic nano-fibrous membranes of PVDF and PMMA-r- PFDMA”*

2nd Place:

Xiaokong Yu, Worcester Polytechnic Institute, *“The chemo-microstructure-mechanical relationships for bitumen”*

Steven Vandal, Worcester Polytechnic Institute, *“Modeling and characterizing cell growth in moss”*

3rd Place:

Kateryna Kushnir, Worcester Polytechnic Institute, *“Carrier dynamics and the role of grain boundaries in polycrystalline PbS films”*

Yuting Liu, Worcester Polytechnic Institute, *“Functional characterization of the human zinc transporter, hZIP4, in the zinc-deficient *S. cerevisiae* strain ZHY3”*

MS Students

1st Place:

Bibi Najma, Worcester Polytechnic Institute, *“ZnO/AAO membrane based integrated multi-analyte FET biosensor for selective and simultaneous detection of amyloid beta and hIAPP precursors”*

2nd Place:

Zachary Thatcher, University of Connecticut, *“Nanoscale Cross Sectional Mapping of Ferroelectric Domains”*

Undergraduate students

1st Place:

Judene Thomas, Mount Holyoke College, *“Ultrasonic Backscatter coefficient, Attenuation Coefficients and Speed of Sound measurement estimates using Human Colon Cancer Cells”*

The meeting ended with the APS-NES, and NanoWorcester Executive Committee meetings.

Recap of Fall 2016 Meeting... Contributed & Poster Sessions



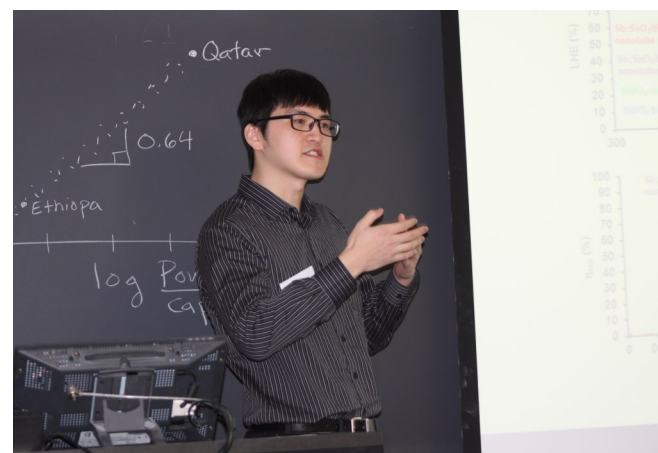
Nancy Burnham, WPI, presenting contributed talk “Mapping the Modulus of Organic Matter in Stiff Nano-Composites across the Thermal Maturity Scale”



Sol Kim, UMass-Lowell, presenting contributed talk “Gas and vapor dependent photoluminescence changes of zinc oxide nanoparticles”



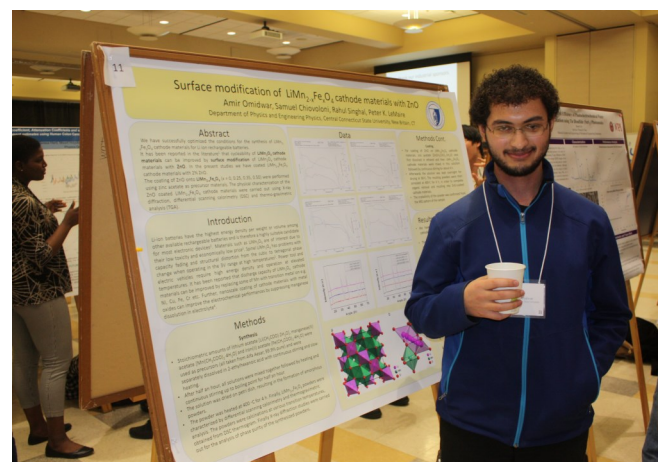
Wisawat Keaswejjareansuk, WPI, presenting contributed talk “Electrospun separators for structural battery applications”



L. Zhou, WPI, presenting contributed talk “Photoanode with enhanced performance achieved by coating BiVO₄ onto ZnO-templated Sb-doped SnO₂ nanotube scaffold”

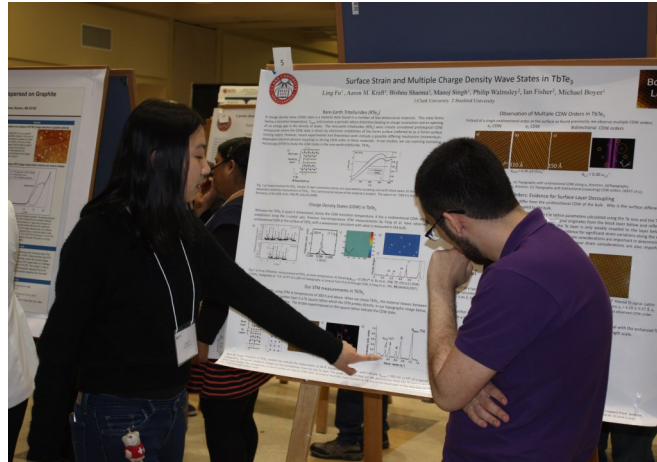


Minh Tri Ho Thanh (right), WPI, giving poster presentation “Vimentin effects on mechanosensitivity of cells”



Amir Omidwar, Central Connecticut State Univ., at his poster presentation “Surface modification of LiMn_{2-x}Fe_xO₄ cathode materials with ZnO”

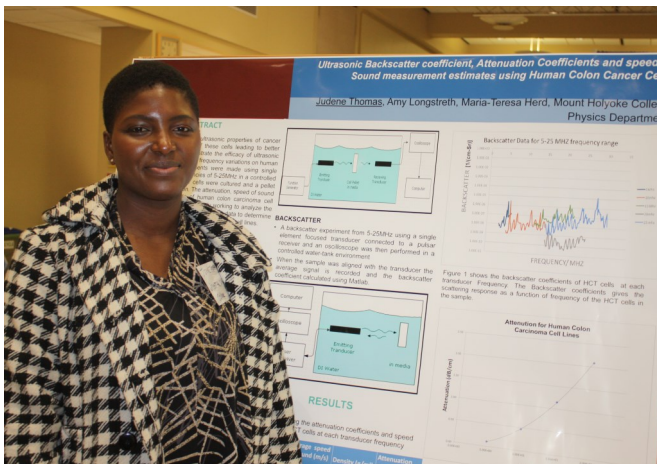
Recap of Fall 2016 Meeting... Contributed & Poster Sessions



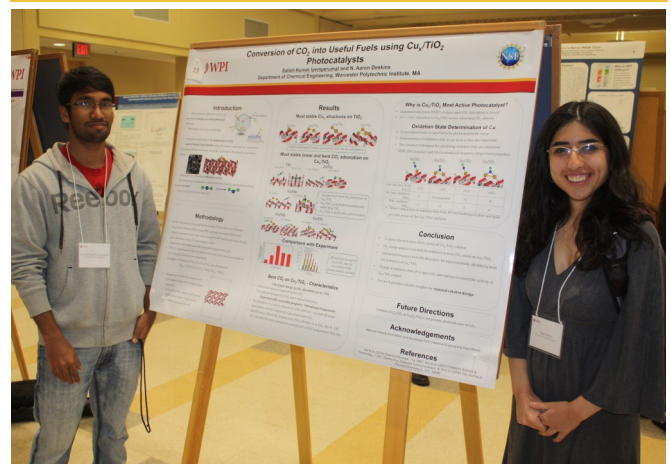
Ling Fu (left), Clark Univ., giving poster presentation "Surface Strain and Multiple Charge Density Wave States in TbTe₃"



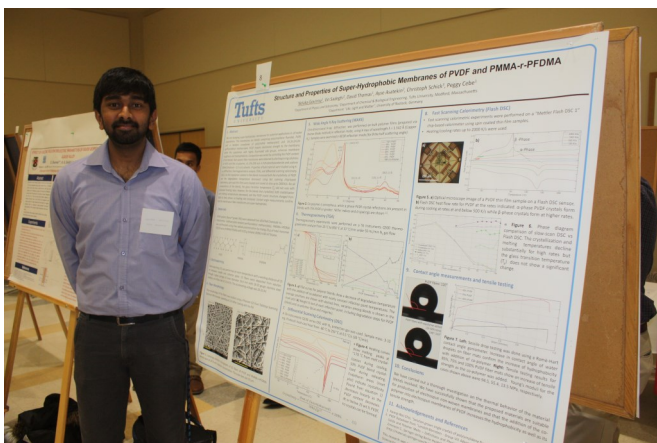
Paul Carr (left), Air Force Research (emeritus), giving poster presentation "How Fear of Nuclear Power is Warming Our Planet"



Judene Thomas, Mount Holyoke College, at her poster presentation "Ultrasonic Backscatter coefficient, Attenuation Coefficients and Speed of Sound measurement estimates using Human Colon Cancer Cells."



Satish Kumar Lyemperumal (left) at his poster presentation "Conversion of CO₂ into Useful Fuels using Cu_x/TiO₂ Photocatalysts"

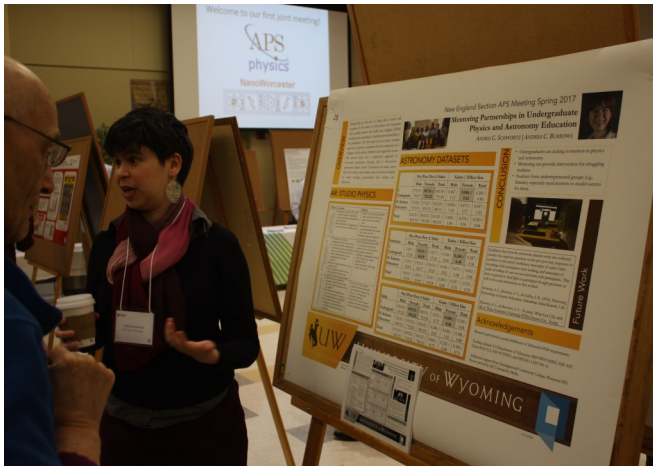


Nelaka Govinna, WPI, at his poster presentation "Structure and properties of superhydrophobic nano-fibrous membranes of PVDF and PMMA-r-PDfMA"



James Kulowiec (right), CCSU, giving his poster presentation "Seasonal Variation in Angular Irradiance from Atmospherically Scattered Sunlight"

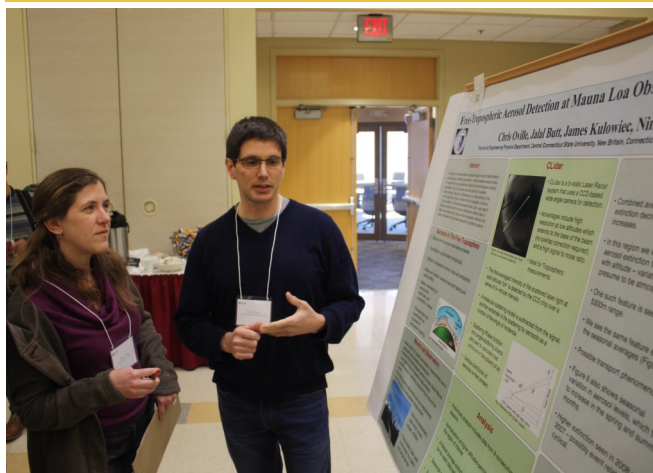
Recap of Fall 2016 Meeting... Contributed & Poster Sessions



Andria Schwartz, giving poster presentation “Mentoring Partnerships in Undergraduate Physics and Astronomy Education”



Finn O'Brien, WPI, at his poster presentation “Innovating Nanoparticle Safety: Storage, Handling, and Disposal Processes”



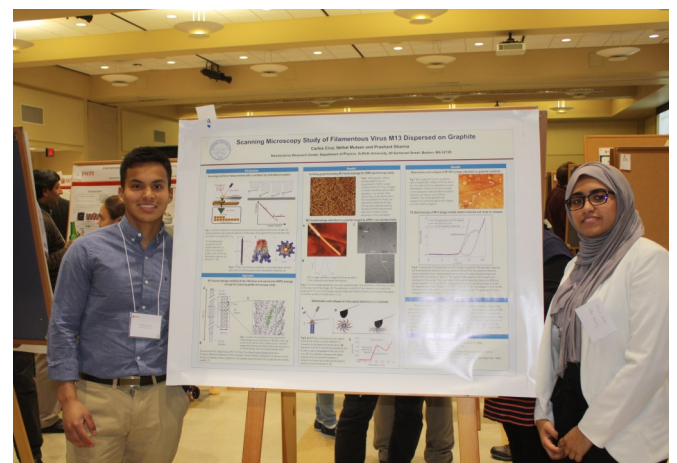
Chris Orville, CCSU, giving poster presentation “Free-Tropospheric Aerosol Detection at Mauna Loa Observatory Using Bi-Static Lidar”



Joseph DePaolo-Boisvert, WPI, giving poster presentation “Studio Physics in a Seven-Week Term with Transportable Labs in a Shared Space”



Dipti Sharma (right), WIT, giving poster presentation “Effect of electric field on dielectric parameters of silver doped chalcogenide glassy alloy”



Carlos Cruz, Ibtihal Mutaen at poster presentation “Scanning microscopy study of the assembly and structure of filamentous virus M13 dispersed on graphite”

Recap of Fall 2016 Meeting... at poster and banquet



**Join APS-NES
at
www.aps.org**



“Food Truck For the Physics Mind”



What is it?

TeachSpin's Food Truck for the Physics Mind, a unique resource for upper level experimental physics education, will be at the Fall 2017 Meeting of the American Physical Meeting at the University of Rhode Island, October 20-21, 2017. Featured in [April's Physics Today](#), this NO COST outreach program brings a 44-foot trailer housing 18 upper - level physics instruments to your campus - all up and running and ready for your faculty, staff and students to explore. It is an opportunity for hands-on exposure to an exciting and inspiring range of topics in classical and modern experimental physics, hosted by the TeachSpin physicists who design and build our apparatus.

What does a visit entail?

There are a multitude of options. During last semester's maiden voyage, the response of both department members and students was exhilarating. In addition to seeing

the apparatus in action, schools arranged for both faculty and students to take actual measurements. We also found time to visit the host school's upper-level labs and share ideas and insights.

The Food Truck for the Physics Mind will be traveling on our way to and from the APS New England Section Meeting in Rhode Island in October. Monday, October 16 is currently open dates. We hope this will be an opportunity to schedule a visit and spend a day with you. After the conference, we are heading back to Buffalo, and are not sure when we will be traveling through the New England states again. If you think your department might like to host a trailer visit, please contact us to express your interest.

How do I arrange a visit to my campus?

The details of the planning will be done by our Vice-President, Lisa Malczewski and her staff, lmalczewsk@teachspin.com or 716-885-4701. They would be delighted to speak with you about scheduling a visit. They will work with department personnel, institution staff and any appropriate security folks to assure a smooth arrival and departure as well as a successful visit.

- **Barbara Wolff-Reichert**



Left: Inside The Food Truck for the Physics Mind

A VIRTUAL TOUR OF TEACHSPINS 'FOOD TRUCK FOR THE PHYSICS MIND'

For more information on each of the following experiments, ctrl click on any of the following

- 1.) [Diode-Laser Spectroscopy](#) : Tuning the interaction of laser light with atoms
- 2.) [Two-Slit Interference](#) : A quantum 'thought experiment' turned actual
- 3.) [Magnetic Force](#) : Confronting the most persistent misconception in E&M
- 4.) [Optical Pumping](#) : Enabling the *radio* -frequency spectroscopy of atoms
- 5.) [Quantum Analogs](#) : The quickest way to build intuition for quantum-relevant wave behavior
- 6.) [Modern Interferometry](#) : Exploiting micrometer, and nanometer, sensitivity to displacement
- 7.) [Noise Fundamentals](#) : When is electronic noise not a nuisance, but a resource?
- 8.) [Fourier Methods](#) : What can you learn by 'thinking in frequency space'?
- 9.) [Earth's-Field Nuclear Magnetic Resonance](#) : The singing of the waters
- 10.) [Torsional Oscillator](#) : Exploring damped, driven, simple harmonic motion
- 11.) [Faraday Rotation](#) : Proving there's magnetism in the electromagnetism of light
- 12.) [Signal-Processor/Lock-In Amplifier](#) : How to extract signals from noise
- 13.) [Magnetic Torque](#) : The surprising results of magnetic torque vs. angular momentum
- 14.) [Nuclear Magnetic Resonance](#) : The basis of the NMR technique in physics, chemistry, and MRI
- 15.) [Ultrasonics](#) : What sound of *Mega* Hertz frequencies can do for you
- 16.) [Muon Physics](#) : Particle Physics at your fingertips, any time and any place

Conference for Undergraduate Women in Physics (CUWiP), Rochester Institute of Technology, January 12-14, 2018 Application deadline: October 13, 2017

Visit <https://sites.google.com/view/cuwip-rit/> for more information or contact
Jeyhan Kartaltepe at jeyhan@astro.rit.edu.

Do you have interesting Physics related articles, new programs, research report, physics talking points etc. that you will like to share with the New England Physics Community?

**Send them to
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Advanced Laboratory Physics Association (ALPhA) New England Conference Report



Attendees at the New England section of ALPhA

On June 14, 2017, the New England section of the Advanced Laboratory Physics Association (ALPhA) held their first Regional meeting at Amherst College, Amherst, Massachusetts. It was a success! There were 25 participants from 13 institutions that met to discuss how to improve their advanced laboratory courses. The conference facilitated networking and cooperation amongst instructors, sponsored hands-on workshops, and had talks highlighting

computation, industry applications, and new experiments. Many said the best part of the conference was the people they met. The next Regional conference will be in summer 2019, as the National ALPhA conference is planned for summer 2018. Those interested in participating could visit the ALPhA website at: <http://www.advlab.org/>.

—Ashley Carter, Amherst College



Left: ALPhA attendees taking a break from a hard day's work

