Fellow Physics Educators and Members of AAPT:

Through the exciting American Association of Physics Teachers New England Section (AAPT-NES), you’ll find out about new education and physics research, professional development programs, and opportunities for collaboration. Check our new web-site at www.aapt-nes.org

People often ask me how to become a “good” physics teacher. I tell them that by attending AAPT conferences I learned all of the demos, tricks, and classroom strategies that I couldn’t learn on my own nor in a college classroom. Of course, twenty years ago, there weren’t PhysTEC programs like at Boston University. Physics training programs have come a long way. In my mid-career, this year, I am spending a sabbatical year at Tufts working in their Center for Education and Engineering Outreach. Most days consists of discussions of education research and curriculum and technology development. Other days, I travel around New England observing the classrooms of some of our best physics teachers. If you have the opportunity to sit in on other teachers classrooms, it makes you reflect on your own teaching. You can learn about some of these topics at our Spring Meeting at Thayer Academy at the end of April 27th and 28th. You can find registration information on the final page of this newsletter.

The theme of our meeting is the future of Space Science. Our Banquet speaker David Latham will be giving a great talk on the Kepler project. Our host, Don Donovan and Thayer Academy are putting together a Banquet fit for royalty; check out the menu at the end of this newsletter! The next day we have three stands of contributed oral papers including several space science talks. We are still accepting poster and oral presentations which can be submitted via the web-site.

As you walk between sessions Saturday morning you may notice scores of high school Physics Olympics students. We are running the Olympics concurrently with the New England AAPT Spring Meeting. This year events include a Fan Cart race, an Egg Drop, quiz bowls and ball dropping analysis. I hope you will take some time to observe the students competing in the Olympics!

Please consider volunteering for one of several open positions on the AAPT-NES Executive Board: Vice President, CT Representative, MA Representative, Four Year College Representative. At lunchtime, we will have an Open Membership Business meeting, where we will elect these positions. Robert Hilborn from AAPT Headquaters will also give a remote Skype welcome at this time.

After lunch we will be trying a Physics Olympics Quiz Bowl event that will include elements of a demo show. In this event, Our Section Representative, David Sturm will provide several “fill-in-the-blank” demonstrations which will be presented to our High School Olympic teams who will have the opportunity to buzz in with correct answers. At the awards ceremony we will honor the Janet Guernsey New England Physics Teacher of the Year and Physics Olympics winners.

Saturday afternoon we are running three workshops: Topics include modeling, dark matter, and black holes!

In the next several pages, in addition to the program for our Spring Meeting, you will find information on several exciting Physics Teacher training programs and summer professional development opportunities. I hope to see you in Braintree at the end of April! A more detailed version of this newsletter can be downloaded from the web-site. Many thanks to our newsletter sponsor, the Lowell Regional Physics Alliance who just celebrated their 20th anniversary!

Gary Garber, President, AAPT-NES

The Lowell Regional Physics Alliance is an academic alliance between the UML physics department and high-school science teachers throughout our region. Established in 1991 to provide support for the teachers and to share common interests. The LRPA presently reaches out to many hundreds of science teachers in the area northwest of Boston as far as Fitchburg, and north to Manchester, NH, and Kittery, ME. A steering committee comprised of physics teachers and UML physics faculty guides the program and activities of the Alliance. Four general meetings are held each year in addition to a full-day of workshop meetings in March. Attendances at the general meetings have ranged from 35 to over 100, and more than 400 high-school science teachers have attended meetings since inception.

AAPT-New England Section Executive Board
President: Gary Garber – Boston University Academy
Past President: Zenobia Lojewska, Springfield College
Treasurer: Frederick Wolf, Keene State
Membership Secretary: Arthur Mittler, UMass- Lowell
Recording Secretary: Karl Martini, Western New England University
Representative to the Council of the AAPT: David Sturm, University of Maine

aapt-nes.org/spring-meeting
SUMMER WORKSHOPS

Physics Modeling Workshops

Tentative Schedule  Session II: August 6-10, 2012
First Parish UU Church, Kennebunk, ME  04043

Workshop Features

- Session is limited to 12 participants.
- Intensive 40-hour/week course.

Workshop leaders: Dean Meggison, 11 years of modeling physics instruction at Kennebunk High School and University of New England. Jamie Vesenka, 11 years of modeling workshop directing experience, Professor of Physics, UNE.

Goals

1. To train teachers in the use of a model-centered, constructivist method of teaching while simultaneously improving their content knowledge in physics.
2. To provide continued professional development for experienced instructors as well as mentoring of new instructors.
3. To integrate computer courseware effectively into the physics curriculum.
4. To establish electronic support and a learning community among participants.

Workshop Details

Modeling approach to physics instruction: Kinematics and dynamics. Please discuss this in advance with the workshop director, James Vesenka. All sessions are M-F 8-5 p.m. Lodging is available for modest rates at local motels or for free with FPUU church members. Non-refundable checks made out to FPUU Kennbunk of $650. Application form and remittance information at:


Contact Information:

FPUU Kennebunk, P.O. Box 235
Kennebunk, Maine 04043

Electronic application submission:  kbkuu@gwi.net

Please write “Physics Modeling Workshop” on the memo line. Graduate course credit from the University of Maine extra – please note out of state tuition is at an additional premium. The school of each participant is strongly encouraged to set aside adequate No Child Left Behind (Title II) funds to support attendance, or laboratory equipment, instructional materials, and/or technology to be purchased at the discretion of the participant to implement the modeling instruction. For more information contact:

James Vesenka: ivesenka@gmail.com (cell: 207-749-7913)

New England Section Newsletter March 2012

InterLACE: Interactive Learning and Collaboration Environment

August 13-17

InterLACE seeks to design, develop, and test an innovative web-based learning environment to support high school students in carrying out collaborative inquiry-based physics lessons. The InterLACE toolkit will provide both content and features that encourage discussion, debate, self-assessment, reflection, and collective sense-making. Our goal is to minimize barriers, such as time, technology, and inexperience with technology and inquiry based instruction, to the successful implementation of collaborative inquiry-based lessons.

Classroom observations have shown us a wide variation among teachers in the use of and comfort level with inquiry methods. As a result, this workshop will focus on both the InterLACE tools and the pedagogical aspects related to inquiry-based learning. During the workshop, we will provide:

- Professional development in collaborative and inquiry-based pedagogy
- Hands-on instruction in the use of InterLACE software
- Guidance in how to develop lessons using the software

Participants will receive continuing education credits.

Please contact Ethan Danahy, (ethan.danahy@tufts.edu) or Leslie Schneider, (leslie.schneider@gmail.com) www.ceeo.tufts.edu/interlace

LEG0 NXT and LabVIEW Summer Institute

July 30 – Aug 3 from 9-4 each day

The LEGO NXT and LabVIEW software are powerful and engaging tools for teaching engineering, technology, science, and math. Tufts University's CEEO Summer LEGO Engineering Institute gives teachers the background they need to make effective use of these tools in their classrooms. Through hands-on, open-ended design projects, participants will learn engineering concepts, LEGO hardware & software, and associated pedagogy/educational theory. The Institute is geared towards high school and middle school teachers. It is open to any K-12 teacher, informal education provider, volunteer, or member of industry interested in learning about LEGO Engineering.

Cost: $650

Please contact Elissa Milto (Elissa.Milto@tufts.edu) with questions.

Participants will:

- Learn about the Engineering Design Process
- Learn LEGO NXT building techniques
- Explore gearing and gear ratios
- Learn to use and program the LEGO NXT
- Understand LabVIEW for LEGO Mindstorms programming logic, control, and sensor input
- Explore the educational pedagogy and theory of using hands-on engineering projects
- Investigate how to teach other content (math, science, reading) through engineering-based projects
- Discuss and develop classroom-management strategies

Participants will leave with:

- A collection of classroom tested LEGO activities
- An introduction to LEGO related resources
- A written plan for implementation in your educational setting
- A workbook of building & programming

aapt-nes.org/spring-meeting
New England Section Newsletter March 2012

**Teacher Training Programs**

*Modern Physics and Dependable Course Schedule Highlight Bridgewater State University MAT Program*

In conjunction with the opening of the new $100 million science complex at Bridgewater State University, the Department of Physics is proud to unveil a revised Master of Arts in Teaching (MAT) in physics program. This professional licensure degree fosters growth in physics, while also enhancing modern teaching techniques. As the only such program offered at a public institution in eastern Massachusetts, this program meets the needs of local physics teachers and enthusiasts.

Dr. Edward Deveney, graduate program coordinator and professor of physics, said the goal of the new MAT in physics curriculum is both to, “emphasize a rigorous study of modern physics (theory, experiment and research) and to provide teachers with a convenient and dependable course schedule.”

Courses offered during the fall and spring semesters will meet once per week in the evening while courses offered during the summer will be held in a one-week intensive format. Also noteworthy, graduate physics classes do not require prerequisites – allowing students to choose their own course sequence. This offers students a dependable schedule to plan for and complete within two years. These courses can be used not only for teachers in the MAT in physics program, but also for professional development purposes, earning PDPs for teachers.

The curriculum is designed to cater to individualized levels of ability and assessment. While students with a less extensive background in physics will find that courses emphasize new foundations and/or refinement of previous skills, recent undergraduates with a stronger physics background will explore more challenging content. There is also an opportunity for students to design and complete a thesis firmly establishing a close working connection with BSU physics faculty members.

Students will experience hands-on learning with state-of-the-art equipment used in modern physics, optics and astrophysics. Access to the new observatory is also available for teachers looking for research tools in the field of astronomy. Interested students and teachers are encouraged to schedule a tour of the new facilities.

Contact Professor Deveney at edeveney@bridgew.edu or the Department of Physics at www.bridgew.edu/physics/ to schedule your visit today.

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**Boston University PhysTEC Program**

Boston University Department of Physics is proud to announce its recent initiatives in K-12 teacher preparation. A collaborative team from the Physics department and the School of Education received a grant as a Comprehensive Site of the Physics Teacher Education Coalition, PhysTEC. Principal investigator (PI) and Master Lecturer, Andrew Duffy will spearhead efforts to graduate an increased number of physics teachers, building upon existing collaborations between the Physics department and the School of Education.

As a key component of the efforts, Boston University Physics Department recently hired its first Teacher in Residence (TIR) Juliet Jenkins. Ms. Jenkins will spend her year at BU initiating outreach activities to promote physics teacher preparation and education. Besides her eight years of classroom experience teaching Physics at Newton South High School, Ms. Jenkins has a degree in Geo-physics from Brown University and a Masters in Education from Harvard Graduate School of Education.

Efforts in the inaugural year include initiating a new Learning Assistant program whereby undergraduates receive training in pedagogy through a School of Education course and work as additional teaching fellow in collaborative problem-solving discussions for Physics courses. Additionally, outreach efforts for faculty, grad students and undergrad majors have focused on expanding efforts in reform teaching methods. The TIR, PI and the co-PI’s Professor Bennett Goldberg and Professor Peter Garik, have run a series of Faculty Teaching Luncheons, Physics Education Journal Club meetings, Undergrad Majors meetings for those interested in teaching, High School Teacher Advisory Group meetings and several newly initiated courses. The courses have ranged from additional early field pre-practicums to recruit more STEM majors into teaching and a new section in the "Studio" style of our algebra-based Introductory Physics course.

For more information on any of these programs, or if you would like to be involved, please contact us! Juliet Jenkins, PhysTEC TIR julietj@bu.edu http://www.phystec.org/institutions/boston-u/

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**Master's in teaching engineering at Tufts University**

The Tufts Education department in collaboration with the Tufts Center for Engineering Education and Outreach are pleased to announce a new program to prepare middle and high school engineering teachers. Tufts has been a leader in the push to include engineering in the K-12 classroom in Massachusetts and beyond and is well-positioned to prepare teachers in an innovative, hands-on environment.

Who should apply:

- Teachers currently teaching engineering without licensure
- Current engineering professionals who may be considering a career in K-12 education
- Engineering undergraduates who are excited about engineering, yet seeking an alternative career path
- People with a passion to improve the STEM education of our students

Candidates enroll in our programs to become middle or high school teachers who understand the importance of education in preparing an active, civically-engaged citizenry and who know how to approach new ideas and challenges, such as how to implement standards-based education in an inclusive classroom. The program leading to licensure endeavor to foster democratic dialogue, vitality, and change. In this way the program reflects a vision of hope and promise for educational change in the communities with whom we place pre-service teachers to practice the skills and competencies of their prospective profession.

The Tufts MAT Program leading to licensure for middle and high school teaching is ordinarily completed within one academic year and two summer semesters, but candidates may choose to extend their studies and practicum experience for a longer period of time. The candidate typically completes 2 summer semesters and one full academic year in a thoughtful scope and sequence of academic course work and field experiences. The field experiences are the focus of the Fall and Spring semesters; courses and field experiences are closely aligned with each other and experienced mentors as well as university supervisors provide valuable feedback and expertise. The summer semesters are focused on academic work in the discipline for which licensure is sought and in foundations and history of educational theory. To learn more about the program, please visit our website or contact Morgan Hynes at morgan.hynes@tufts.edu.
Lowell Regional Physics Alliance

Arthur Mittler
UNIVERSITY OF MASSACHUSETTS LOWELL
Department of Physics and Applied Physics
1 University Avenue, Lowell, Massachusetts 01854
arthur_mittler@uml.edu  (978) 934-3775

The Lowell Regional Physics Alliance is an academic alliance between the UML physics department and high-school science teachers throughout our region. Established in 1991 to provide support for the teachers and to share common interests. The LRPA presently reaches out to many hundreds of science teachers in the area northwest of Boston as far as Fitchburg, and north to Manchester, NH, and Kittery, ME. A steering committee comprised of physics teachers and UML physics faculty guides the program and activities of the Alliance. Four general meetings are held each year in addition to a full-day of workshop meetings in March. Attendances at the general meetings have ranged from 35 to over 100, and more than 400 high-school science teachers have attended meetings since inception. The primary goals for the LRPA are:

- To provide a forum in which science faculty from area high schools, colleges and the University can meet regularly to share ideas and discuss topics in physics and physics teaching.
- To provide workshops on special topics in physics and physics teaching.
- To facilitate interaction between science teachers, university faculty, and local industry scientists to stay informed of current applications of physics in technology.

ACTIVITIES

The general meetings of the LRPA are held from 3:30 - 6:00 pm and are usually of two parts. The first half includes one or more invited talks on an announced topic, presented by high school teachers, university faculty, or a special guest speaker. Past guest speakers have included Woodie Flowers (MIT), Paul Hewitt (textbook author), Philip Sadler (Harvard), Philip Morrison (MIT), Melissa Franklin (Harvard), Eric Chaisson (Tufts), Margaret Geller (Harvard), Gerald Holton (Harvard), as well as UML faculty and state science coordinators for Massachusetts and New Hampshire. Teacher presentations are wide ranging, and have included such topics as Physics Laboratory Projects, Comparative Teaching Methods in the US and Overseas, Computer Interfacing in the Physics Laboratory, Electronic Networking, Favorite Physics Demonstrations, Physics on the WWW, Energy Sources of the Future. The second half of a meeting is devoted to sharing physics classroom demonstrations among the attendees. Most meetings also include a free raffle of donated equipment and the proceedings are videotaped as a teacher resource. A full day meeting in March offers several workshops on a variety of topics, including American Association of Physics Teachers PTRA workshops. Assistance in organizing and running the meetings is provided by UML student volunteers. Attendance at the meetings can generally be used by teachers toward fulfilling recertification requirements.

Support for the LRPA is mainly from the UML College of Science which enables us to keep our membership fee at zero.

New England Section Newsletter March 2012

The Physics Education Research Laboratory (PERL) In the University of Maine Department of Physics & Astronomy

Begun in 1995 and under its modern name since 2001, PERL interests include student understanding of specific physics concepts, the use of mathematics in physics learning, models and mechanisms of human reasoning and learning, curriculum development and dissemination, teacher professional development, and the organization of a number of national and local conferences in PER.

PERL is known for leading research in physics courses beyond the first year, in projects such as the Intermediate Mechanics Tutorials, the Intuitive Quantum Physics course, and work in upper-level thermodynamics and stat mech. Results are regularly presented at national APS and AAPT meetings, the PERC, TRUSE, FFPER, and other conferences. Collaboration with other universities’ PER programs are common.

Led by Michael Wittmann and John Thompson, PERL includes a large faculty (Wittmann, Thompson, MacKenzie Stetzer, Don Mountcastle, David Clark, Natasha Speer, and Jonathan Shemwell), postdoctoral and doctoral students, masters and undergraduate students. Graduate PER students are supported by TA or RA and graduate with MA or PhD degrees in physics. Also, through the Maine Center for Research in STEM Education (RiSE), students pursuing a Master of Science in Teaching (MST) can work with PERL for thesis work in physics.

More information on PERL: http://umaine.edu/per/ on RiSE: http://umaine.edu/center/

The 33rd Annual UMaine Physics & Physical Science Teachers’ Meeting will be Friday, March 15, 2013. Information about TRUSE and FFPER is on PERL’s website.
Spring Meeting Thayer Academy

Friday Night April 27th
5:00 Registration and Poster Session – light snacks and drinks available (cash bar) (Poster abstracts on web-site)
6:00 Share a Demonstration
6:30 Banquet Dinner
7:45 Keynote Speaker: David Latham
8:30 Observatory open

David W. Latham is a Senior Astronomer at the Smithsonian Astrophysical Observatory in Cambridge. He is a co-investigator on the Kepler project.

Super Earths and Life

Transiting planets are special. The amount of light blocked by the planet as it passes in front of its host star sets the size of the planet. If an orbit can be derived from Doppler spectroscopy of the host star, the light curve also provides the orientation of the orbit, leading to the mass of the planet. The resulting density for the planet can be used to constrain models for its structure and bulk properties. Can we find rocky worlds with the right temperature for water to be liquid on the surface? NASA’s Kepler mission has shown that small planets are common, but the real challenge is to measure their masses. Future space missions such as the Transiting Exoplanet Survey satellite and the James Webb Space Telescope will be able to use remote sensing to probe the atmospheres of transiting planets in a search for biomarkers that are signs of life.

Posters: Friday Night

Jerold Touger
WebLinks: An Online Resource for single-Concept Exploration
Curry College
jtouger@curry.edu

Examples will be shown of WebLinks. These are short interactive Flash scenarios, each exploring a single concept. Many involve animation. I developed several WebLinks per chapter for my textbook (Introductory Physics: Building Understanding, John Wiley & Sons) but they are freely available online, and I would like folks to be aware of them as a resource.

New England Section Newsletter March 2012

Laurence I. Gould
“Global Warming, Climate Change” — A Critical Look
University of Hartford
lgould@hartford.edu

There continues to be an increasing number of scientists from around the world who are challenging the dominant claim that has been bolstered by so-called “consensus” scientific views — that dangerous “global warming/climate change” is caused primarily by human-produced carbon dioxide. This poster will show that scientific evidence contradicts that claim. It will also explain some of the errors that have been introduced from a corruption of the scientific method. (Further information can be found at http://uhaweb.hartford.edu/lgould/)

Deborah Mason-McCaffrey, Ph.D.
A Force is a Force — Extending a Newton’s Third Law Interactive Lecture Demonstration to Forces Acting at a Distance
Salem State University
dmasonmccaffrey@salemstate.edu

Many students confuse momentum or acceleration with force. They are convinced that large objects exert larger forces on smaller objects or that fast-moving objects exert larger forces on slow-moving objects. These contact force misconceptions are very effectively addressed by Thornton & Sokoloff’s Newton’s Third Law Interactive Lecture Demonstration (N3L-ILD).

However, after several years of using the N3L-ILD with my students, it became obvious that they did not understand that Newton’s Third Law also applies to electrostatic, magnetic and gravitational forces — forces acting at a distance. An inexpensive magnetic extension to the Newton’s Third Law ILD was designed and piloted last Fall. There is initial evidence that it has had some efficacy in addressing student misconceptions.

Norma M. Chase
Does requiring graded online homework in Mastering Physics improve student learning? (Report on a two semester long experiment)
Massachusetts College of Pharmacy and Health Sciences
norma.chase@mcphs.edu

Mastering Physics (MP) scores and exam performance were tracked periodically throughout a two semester long (first run of) a new, calculus-based, introductory physics sequence. At the end of the first semester, data indicated a statistically significant rank correlation between MP scores and exam scores; however, student assessments of the usefulness of MP were quite mixed. Informed by the results of Fall semester’s experiment, the instructor made targeted changes in the approach to using MP in all Spring courses. The goals of these targeted changes were a) to maximize the positive impact of MP on student learning and b) maximize the likelihood that students would find that it assisted their learning. This paper present the results of “phase 2” of the MP experiment and compares them with “phase 1” results. The merits of the instructor’s targeted changes to MP assignments are evaluated.

aapt-nes.org/spring-meeting
Saturday April 28th
7:30 Breakfast and Registration
8:00 Contributed talks (abstracts on web-site)
9:30 Coffee Break
10:00 Invited Talks
11:45 Lunch
12:00 Open Meeting of the Membership
12:30 Remote Address by Robert Hilborn, of AAPT
1:15 Demo Show and Olympics Quiz Bowl
1:45 Awards (Physics Olympics and Janet Guernsey)
New England Physics Teacher of the Year Award)
2:00 Workshops
5:00 Meeting adjourns

Contributed Talks:

Room A

8:00 AM  Room A
Elizabeth Cavicchi
Exploring Space Together – with Galileo!
Edgerton Center, MIT
ecavicchi@mit.edu

Physics lore makes Galileo into such a “giant” as to efface his personal experiences of curiosity, uncertainty, doubt, and wonder. For participants in my recent “Galileo” seminar, Galileo’s ability to say “I don’t know” opened space for our own deepening wonderings. Galileo’s perspective stirred up confusion, unexpected observations and far-reaching realizations about physics, history, teaching and learning, and ourselves. Encounters with Galileo in physical space included: his – and our! – thrilling first telescopic observations; pennies, clay and weights that in our hands came into balance like that held by a youthful Galileo; debates about evidence for Earth’s motion; nighttime observation. When he published La Bilancetta in which he proposed an alternative method to Archimedes’ almost mythical determination of the mineral composition of King Hiero II’s crown. In this text, Galileo explains how he recreates Archimedes’s experiment. When he published his seminal work Dialogue of Two World Systems in 1632 however, the details of his experiments were not explicitly stated. The evolution of Galileo’s publications mirrors his ever-changing relationship with the Church to only speak theoretically of the Copernican model is reflected by his rhetorical style in the Dialogue. In Elizabeth Cavicchi’s course, “Recreate Experiments from History: Inform the Future from the Past,” we had the opportunity to recreate experiments already performed by Galileo, such as the little balance and nighttime observation. Yet, at the same time, we were sure to always maintain space to explore on our own and devise our own investigations inspired by his work. Having grown out of our own wonder, confusion, and conviction, the knowledge that arose from this second category of experiments belongs so completely and totally to us.

8:30 Room A
Amanda Pillsbury, Madhuvanti Anantharajan, Stephen Ray, Yang Yang, Laura Scher
PARALLEL JOURNEYS: GALILEO’S DISCOVERIES AND OUR OWN
Harvard Graduate School of Education
atp258@mail.harvard.edu

In 1586, Galileo published La Bilancetta in which he proposed an alternative method to Archimedes’ almost mythical determination of the mineral composition of King Hiero II’s crown. In this text, Galileo explains how he recreates Archimedes’s experiment. When he published his seminal work Dialogue of Two World Systems in 1632 however, the details of his experiments were not explicitly stated. The evolution of Galileo’s publications mirrors his ever-changing relationship with the Church. A warning by the Church to only speak theoretically of the Copernican model is reflected by his rhetorical style in the Dialogue. In Elizabeth Cavicchi’s course, “Recreate Experiments from History: Inform the Future from the Past,” we too constructed our experimental procedure from our interpretation of Galileo’s words, with a greater emphasis on our own ideas and understandings. Our investigation of falling bodies (captured on high speed video), while inspired by passages from Galileo’s Dialogue, was undeniably our own work. Consequently, our experience reached beyond the physical science we explored. Through Galileo’s story, we explored the effects of censorship and the relationship between science and society. For any teacher of physics, his is unquestionably a story worth exploring.

New England Section Newsletter March 2012

Amanda Pillsbury, Madhuvanti Anantharajan, Stephen Ray, Yang Yang, Laura Scher
RECREATING EXPERIMENTS FROM HISTORY/CREATING OUR OWN KNOWLEDGE
Harvard Graduate School of Education
atp258@mail.harvard.edu

Recreating experiments from history provides a powerful platform for learners to engage with experiments from the past and to understand firsthand the origins of the scientific method that now forms the basis of all scientific work. Simply recreating a step-by-step process from the seventeenth century, however, can oftentimes feel no different than carrying out a procedure from a current scientific text. The wonder, confusion, and conviction of the experimenter—the conditions that ultimately contributed to discovery—are obscured. Learners are robbed of the complexity of the experiment and also of the opportunity to forge their own connections to the results from diverse cognitive and disciplinary entry points. In Elizabeth Cavicchi’s course, “Recreate Experiments from History: Inform the Future from the Past,” we had the opportunity to recreate experiments already performed by Galileo, such as the little balance and nighttime observation. Yet, at the same time, we were sure to always maintain space to explore on our own and devise our own investigations inspired by his work. Having grown out of our own wonder, confusion, and conviction, the knowledge that arose from this second category of experiments belongs so completely and totally to us.

8:15 Room A

aapt-nes.org/spring-meeting
A common misconception among beginning students taking introductory physics is that in order for there to be acceleration, the speed of a particle must change. This is, of course, not true; simple circular motion, for example, has constant speed but it is continuously accelerating due to the change in the direction of the velocity vector. This acceleration can be shown to be directed inwards “seeking a center”; as such, it is always pointing perpendicular to the velocity vector and redirects the particle to curl in on itself. What is also often not fully appreciated is the fact that the centripetal acceleration, is always an effect and never a cause; central forces are needed to cause such acceleration. These principles can be demonstrated quite simply, and quite dramatically, using real-life ships as examples. In this short note, we work out some typical examples involving aircraft carriers and supertankers, calculating among other quantities, turning times, requisite forces, and deflection distances. The Titanic is also among the examples singled out for investigation in order to demonstrate the power of simple physical analysis.

**New England Section Newsletter March 2012**

8:45 Room B
**Yan Yang**
Ask a Question
**Harvard Graduate School of Education**
yay964@mail.harvard.edu

What’s Galileo’s interpretation of Archimedes’ experiment? What was Archimedes’ elegant way of telling the mineral composition of the crown? We, a group of learners, relived the experience of a monumental figure like Galileo, by recreating his experiments. Galileo’s interest was in Archimedes’ experiment, which he wanted to demystify, and we in turn, recreated Galileo’s replication of Archimedes’ experiment. As a fellow learner and a researcher, I struggled in the process of getting at the core of the experience, understanding what Galileo’s stipulation really was, and how that was more elegant than the view of Archimedes’ experiment held by Galileo’s contemporaries. At the same time, I struggled to understand other people’s thinking and try to make sense of their thoughts. I kept my own sense of confusion separated from the effort of understanding others. With the encouragement from our teacher Elizabeth Cavicchi, I came to sense the shape of my confusion, brought it up in our class meetings, and asked a question that, as it turned out, belonged to us already.

9:00 Room A
**Laurence I. Gould**

**BUT IS IT VALID SCIENCE? — Subjecting Claims about "Global Warming" to Critical Thinking in the Classroom**
University of Hartford
LG Gould@Hartford.EDU

Uncompleted as our theories may be, they all enjoy, in a sense, the benefits of due process of law. Dogmatism cannot enter, and unsupported demagoguery could not survive in a society which demands evidence which can be subjected to examination, to reexamination, to doubt, to questions, to cross-examination.

—Jerrold Zacharias

"[the most significant scientist who initiated the effort to improve K-12 science education in the United States starting in the 1950s]; Hands On! A magazine for mathematics and science educators (TERC, Fall 2006), Vol. 29, Number 1, p. 4]

Not many science educators appear to know about the contradictory evidence and careful reasoning which refute the claim that human-produced carbon dioxide is causing dangerous "global warming/climate change" (AGW). This talk will explain how classroom interactions can include seldom-discussed scientific evidence contradicting claims about dangerous AGW. It will also explain what are some of the little-known methodological flaws, in the promotion of AGW, that continue to threaten science education.*

*Handouts at talk.

**Room B**

8:00 Room B
**Christopher Pilot**
Turning with Centripetal Acceleration; Examples with Ships
**Maine Maritime Academy**
chris.pilot@mma.edu

A common misconception among beginning students taking

8:45 Room B
**Jim Kernohan**
Milton Academy

How a class of high school students confirmed the existence of an extrasolar planet
**Email: jim_kernohan@milton.edu**

Using the MicroObservatory telescopes, my students took almost 100

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images of a star suspected of having planets over the course of one night. We analyzed the images and compared the brightness of the star relative to some near by stars and plotted this intensity versus time. We saw a dip in the star's brightness and from this were able not only to confirm the existence of a planet but also calculate the size of this planet relative to the star.

9:00 Room B
Gary Garber: Boston University Academy
A Reduced Gravity Pendulum
garber@bu.edu

We experimented with a simple pendulum on a NASA reduced-gravity flight. Your students can measure the period of the pendulum on our flight using accelerometer data from Vernier sensors. We also videotaped the results and image analysis can be used to measure the period. We used both a string pendulum and a rigid rod pendulum. Our data includes results from hyper gravity (2g), Martian gravity, lunar gravity, Earth gravity, and microgravity. Learn how you can access and analyze the data in your classroom.

Room C
8:00 Room C
Ed Deveney: Bridgewater State University
Bridgewater State University's revised MAT Program
deveney@bridgew.edu

Details of BSU's revised MAT physics program that emphasizes a rigorous study of Modern Physics (theory, experiment and research) will be detailed. The revised program is the result of feedback from MAT Physics students who have clamored for a workable schedule that they can plan for with courses that offer a high level of physics content. The program is designed to cater to individualized levels of ability and assessment and the credits for the course can be used toward both the MAT in Physics and in General Sciences programs and for professional development (earning PDPs) as well. Highlights include:

- a 3 Year fixed rotation of courses students can plan on.
- courses offered each fall and spring semester in the evening, convenient for teachers, along with a one-week summer course.
- offer the opportunity to do a realistic thesis to be done with one of the BU faculty in new Science Building.

8:15 Room C
Andrew Duffy: Boston University
An Electronic Physics Textbook for the iPad
aduffy@bu.edu

In this talk, I will report on an ongoing project involving turning an introductory physics textbook into an iPad app (actually two apps, one for each volume of the book). As of the end of February 2012, 11 chapters are finished and available through the App Store, and chapters are being added at the rate of one every 3-4 weeks. Ultimately, the project will have about 30 chapters. The electronic version of the book includes some simulations and animations, as well as links to some movies I have posted on YouTube for the students in my algebra-based introductory physics course to use as they prepare for class. I will demonstrate some of the features of the electronic book, and talk about features I would like to add in future. Attendees who are interested will also be given codes to download the apps for free.

8:30 Room C

New England Section Newsletter March 2012

Gary Garber and Leslie Schneider: Tufts University Center for Engineering Education and Outreach
InterLACE: Interactive Learning and Collaboration Environment
ggarber246@comcast.net
leslie.schneid@gmail.com

The InterLACE Project seeks to design, develop, and test an innovative web-based learning environment to support high school students in carrying out collaborative inquiry-based physics lessons. The InterLACE toolkit will provide both content and features that encourage discussion, debate, self-assessment, reflection, and collective sense making. Our goal is to minimize barriers to the implementation of collaborative inquiry-based lessons, such as time, technology, student experience, etc. This past year, a design team of five teachers participated in the project. This coming year we are expanding to include 20 teachers.

8:45 Room C
Juliet Jenkins: Boston University Physics Department
Boston University PhysTEC and Teacher in Residence Explained
Email: julietbj@bu.edu

Boston University (BU) is one of the nation’s largest private universities with over 31,000 students. BU is an urban school with a long history of partnerships with high need districts in the Greater Boston area. As the first Physics Teacher Education Coalition (PhysTEC) site in New England, and one of a small number of sites in a major urban center, BU intends to be a national model for projects aimed at improving physics instruction in high-need areas. The Teacher in Residence is a linchpin of most successful teacher preparation programs around the country. The Teacher-in-Residence (TIR) acts as an agent of change who applies classroom wisdom to the tasks of identifying, training, and supporting teachers of physics. Come learn the details of our first year with this program at BU!

9:00 Room C
Vandana Singh: Framingham State University
More than “Cool Science”: Science Fiction and Science Fact in the Classroom
ysingh@framingham.edu

Science fiction in the form of stories and film has sometimes been used in the classroom to enable learning of physics concepts, and to stimulate the imagination. This presentation describes a pilot study in which a science fiction short story was assigned to a calculus-based college physics class in combination with a science news article on the same theme. Not only did this double assignment enhance the learning experience of the majority of students, it also stimulated speculations on the intersection of science/technology and society. Because the story was emotionally engaging and elegantly written as well as fascinating from the scientific perspective, it allowed students to engage with the material in a more complete way. A few students who ordinarily did not take an active part in classroom discussions wrote with feeling and intelligence about the multiple dimensions of the exercise. In anticipation of a more detailed study, the author hypothesizes that carefully selected combinations of science fiction stories and science news articles can serve to accomplish more than enhanced learning and interest --- that it may be possible to use such exercises to create well-rounded scientific thinkers able to move easily between scientific/technological and human aspects of real-world science.
Invited Speakers

**Space Astronomy in 2012**
Jonathan McDowell  
*Harvard-Smithsonian Center for Astrophysics*

The flood of new discoveries from our space telescopes continues unabated. I’ll talk about the active observatories carving out different chunks of the electromagnetic spectrum, and the different kinds of astrophysics we learn from them, from Spektr-R in the radio to Fermi in the gamma-ray band. I’ll go into some more detail about the Chandra observatory, whose control center is in nearby Cambridge, MA, and then preview the missions we hope will fly in the coming years, including the James Webb Space Telescope.

**Broad Band, High Resolution X-Ray Spectroscopy Using Microcalorimeters**
*Spin-Offs from Astrophysics Research*
Eric Silver  
*Harvard-Smithsonian Center for Astrophysics*

High resolving power, a bandwidth that can span 0.1-120 keV and low internal background are the hallmarks of cryogenic X-ray microcalorimeters. Originally developed for spectroscopy of cosmic X-ray and gamma ray sources such as black holes, supernova remnants and clusters of galaxies, we are now using microcalorimeters for a wide range of scientific and industrial applications on Earth. These include fundamental physics measurements of highly charged ions produced in laboratory plasmas and heavy ion accelerators as well as industrial and medical applications where high resolution X-ray spectroscopy is important to materials and chemical analysis. I will discuss the important features of our detector technology and review some of our recent experimental results.

**Lunch And Open Membership Meeting:**

At Lunchtime we will be having our open membership meeting where we will give updates on future section planning, section business, and have elections for new officers. During our meeting, Robert C. Hilborn Associate Executive Officer of the American Association of Physics Teachers will give a live Skype address to our membership. At the same time, the Physics Olympics will be having a great spectator event called Junkyard Dogs where the students will be assigned to work in teams to build a surprise invention!
Directions to Thayer Academy

**Thayer Academy**
745 Washington Street • Braintree MA 02184

**By Car From Boston**
Take Exit 17 off Route 3 South. Follow the rotary and take the first right onto Union Street toward Braintree. Go up the hill on Union Street. Follow directions from Points South.

**By Car from Points South**
Take Exit 17 off Route 3 North. Follow the rotary around past its first exit, past the on-ramp to Rte 3, and past the off-ramp from Rte 3. Then take a right onto Union Street toward Braintree. Go up the hill on Union Street to the second traffic light at the top of the hill. Take a right onto Washington Street and then the first left onto Hobart Avenue.
The Upper School campus and parking lot will be on your immediate left. The Middle School campus and parking lot are a little farther down Hobart Avenue on your right.

**By Car From Points West**
From Route 93 North, take Exit 6 (the Route 37 exit). Bear right as you come off of the exit onto Granite Street so that you pass Braintree's South Shore Plaza on your left. At the third set of lights, you will arrive at Braintree's Five Corners intersection. You will see a Dunkin Donuts on your right. At the light, bear slightly to your left onto Franklin Street, keeping Bertucci's restaurant on your right. After the entrance to Braintree High School on your right, take the next left onto Lakeview Avenue. At the stop sign, you will see Thayer's playing fields and the Upper School campus straight ahead on the right. Go straight across the intersection, and bear right, keeping the playing fields on your right. Thayer Middle School will come up on your left, and a bit further down, Thayer Upper School will be on your right.

**By Public Transportation**
For visitors who take the MBTA or commuter rails, Thayer is a short (500 yard) walk from the Braintree stop on the Red Line up the hill from Union Street.

**Hotels**

- **Boston Marriott Quincy** $140 to $180
  3 miles
  1000 Marriott Drive
  Quincy, MA 02169
  (617) 472-7095

- **Holiday Inn Express Hotel Braintree** $145 to $160
  3 miles
  190 Wood Road
  Braintree, MA 02184
  (781) 848-1260
  hiexpress.com?

- **Hampton Inn** $126 to $150
  3 miles
  215 Wood Road
  Braintree, MA 02184
  (781) 519-9051

- **Candlewood Suites** $85 to $120
  3 miles
  235 Wood Road
  Braintree, MA 02184
  (781) 849-7450

**Friday Night Banquet Menu:**
Poster Session: Spring Vegetable Crudités, Euro Cheese and Local Cured Meats, Berries
Banquet Meal: Crisp Caesar Salad topped with Parmesan crisps, pear tomato, chive pesto
Balsamic Carrot and Garlicky Broccoli
Carving Station with Black Angus Roast Beast, Free Range Turkey Breast (Lava Pesto, Hors Radish Cream, Dill Chive Sauce, Roasted Cranberry Gravy)
Mashed Potato Bar (Build Your Own) Perfect mashed with extra butter and all the trimmings, crisp large bacon, blue cheese, farm chives, black pepper sour cream, 4 cheese mix, raw cinnamon sugar, roasted garlic clove

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Registration Page

Name: __________________________________________________________

Position or Title: ________________________________________________

Institution: _____________________________________________________

Address: ________________________________________________________

Phone: ____________________________ e-mail: ________________________

Workshop Registration:

**Modeling** ($5) ______
**Dark Matter** ($15) ______
**Cool Astronomy** ($5) ______

Conference Registration: $40 ______

Friday Night Banquet: $40 ______

Total ______

Subtract $10 if you are a lifetime member of NES-AAPT

Checks should be made out to Thayer Academy

Alternatively, you may call in your credit card number to Thayer Academy.
Call Don Donovan at 781-664-2216 Please mail registration form and checks should be mailed to:

**Don Donovan**
Head, Science Department
**Thayer Academy**
745 Washington St.
Braintree, MA 02184

*Forms must be received by April 20th*

To pay by Credit Card:

Type of Card: __________________________

Account #: ________________________________

Name on Card: ____________________________

Exp Date: ________________________________

Security Code: ____________________________

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