NCS-AAPT

North Carolina Section of the American Association of Physics Teachers

Program and Abstracts

9th Annual Spring Meeting
Davidson College
Davidson, NC 28035
October 29-30, 2004

EPITOME
NCSAAPT Meeting – October 29-30, 2004

Friday evening, October 29

2:00 - 4:00	HTML workshop for two-year college teachers– led by Mario Belloni and Aaron Titus	Dana 127
6:00 – 9:00	Vendors	Dana 111 and 127
5:30 – 8:00	Registration	Dana Lobby
7:00 – 7:50	Public Lecture: Craig Bohren (Penn State University): Reflections on the Blues	Dana 146
7:50 – 8:00	Recess	
8:00 – 8:50	Public Lecture: David Hestenes (Arizona State University): Mathematical tools for thinking physicists	Dana 146
8:50 – 9:30	Reception and Social	Dana 111 and 127
9:30 - ???	Two-year College Physics Teachers Alliance (Best Western Motel meeting room)	

Saturday, October 30

7:30 – 12:30	Registration	Dana Lobby
7:30	Coffee	Dana Lobby
8:00 – 2:00	Vendors	Dana 111 and 127
8:00	Invited Talk: Robert Panoff (The Shodor Educational Foundation): Computational (Physics Education) and (Computational Physics) Education – Lessons in Applying Interactive Learning Environments	Dana 146
8:20	Coffee	Dana Lobby

Parallel Sessions	**A. Dana 146**	**B. Dana 153**
8:30 – 8:45	**A**. Zhang (Elizabeth City State): An Electro-optical device of PLZT (9/65/35)	
		B. Agrest (College of Charleston): Recording notes during introductory physics lectures – Multi-dimensional interaction
8:45 – 9:00	**A**. Dooling (UNC – Pembroke): The Boltzmann Factor with Interactive Physics	
		B. Titus (High Point): When an experiment becomes a discrepant event
9:00 –9:15	**A**. Schulze and Harris (The Science House, NC State): Visualizing Physics	
		B. Dancy (UNC Charlotte) and Henderson (Western Michigan): Why does it stay broken? - Examining educational change
9:15 – 9:30	**A**. Bennett (UNC Asheville): Learning Efficiently with On-line Homework	
		B. Crider (Elon): Astronomy in the Hot Seat
9:30 – 9:45	Break	Dana Lobby

Mid-morning Session	**Dana 146**	
9:45 – 10:00	Winborne and Britton (NCSSM): From the laboratory to the Competition field: Robotics and Physics	
10:00 – 10:30	Invited Talk: Gary White (SPS Director): Secret Lives of the Hidden Physicists	
10:30 – 11:30	***SPS Poster Session*** (See separate program for this session.)	***Dana 111 and 127***
Late-morning Session	**Dana 146**	
11:30 – 11:45	Sherwood and Chabay (NC State): Choice of System and the Energy Equation	
11:45 – 12:00	Christian (Davidson College): The Numerical Solution of few-body problems	
12:00 – 12:15	Collins (Warren Wilson): Quantitative astronomy with consumer digital cameras	
12:15 – 12:30	Belloni and Gilbert (Davidson) and Doncheski and Robinett (Penn State): Much Ado about nothing: A diversion into allowable solutions of the 1-D Schrödinger equation	
12:30 – 1:15	Lunch	Commons
1:15 – 1:45	NCS-AAPT Business meeting	Commons
Parallel Sessions	**A. Dana 146 B. Dana 153**	
2:00 – 2:15	**A**. Mamola (Appalachian State): Einstein in Cutchogue **B**. Bingham (UNC Wilmington): Outdoor Laboratory Activities for Liberal Arts Physics	
2:15 – 2:30	**A**. Beck (UNC Asheville): Eratosthenes and "The Noonday Project": Outreach at a Local School **B**. Howard (Rowan-Cabarrus CC): Resources for Online Astronomy Labs	
2:30 – 2:45	Hubisz (NC State): When is an error not quite wrong?	Dana 146
Take Fives	**Dana 146**	
2:45 – 2:50	Christian (Davidson): A demonstration of Tracker: A Java-based Open Source Video Analysis Tool	
2:50 – 2:55	Collins (Warren Wilson): Physics Photo of the Week	
2:55 – 3:00	Rathbun (Davidson): Schlieren Imaging with an Inexpensive PC Web-Cam	
Workshops		
3:00	Break	Dana Lobby
3:00 – 5:00	Workshops:	
	Tablet PC: Dan Boye	Dana 126
	Physlets/OSP: Wolfgang Christian and Mario Belloni	Dana 127

PROGRAM

Friday, October 29, 2004

2:00 - 4:00 HTML workshop for two-year college teachers - Dana 127
(led by Mario Belloni and Aaron Titus)

5:30–8:00 Registration - Dana Science Building, Lobby

7:00–7:50 Public Lecture - Dana 146

Reflections on the Blues

Craig Bohren, Department of Meteorology, 505 Walker Building, University Park, PA 16802, Telephone: (814) 865-2951, E-mail: bohren@ems.psu.ed

Why is the sky blue? The answer is usually wrong, misleading, or incomplete. Saying that "Rayleigh scattering" is responsible for the blue sky is suffocating understanding with jargon. Red sunsets and sunrises are not simply the inverse of the blue sky. Although molecular scattering is the origin of the blue sky, transmission of sunlight through a molecular atmosphere cannot yield red. Small suspended particles are necessary. Absorption by ozone plays no role in the blueness of the sky except at twilight.

Skylight is not entirely blue light, does not peak in the blue, and is not uniform in color and brightness: it is darkest and the purest blue at zenith, brightest and of lowest purity at the horizon. Although the whiteness of the horizon sky is almost invariably attributed to "big particles", it would be white in an atmosphere free of any particles. A corollary of this is that the sky would have a markedly different color if Earth's atmosphere were considerably larger.

The sea, glaciers, icebergs, and icefalls are blue. Whereas sky blueness is a consequence of selective (wavelength-dependent) scattering, that of pure water (liquid and solid) is a consequence of selective absorption. It is sometimes said that all colors in nature are attributable to electronic excitations. Water provides a counter-example. An absorption minimum for water in the blue-green is a consequence of infrared absorption bands, overtones and combinations of which descend into the visible.

7:50–8:00 Recess

8:00–8:40 Public Lecture – Dana 146

Mathematical tools for thinking physics

David Hestenes, Professor Emeritus, Arizona State University, Physics and Astronomy Department, P.O. Box 871504, Tempe, AZ 85287-1504, Phone: 480-965-6277, Fax: (480) 965-7954, Hestenes@asu.edu

Mathematics is essential for understanding physics, so how should that play out in the high school math/science curriculum? "Conceptual physics" courses ignore the problem. Mathematics teachers are oblivious to the problem. Physics teachers, at least, can understand the problem, though curriculum reform is fraught with difficulty.

We answer two questions: (1) what mathematics is most essential for general scientific literacy? (2) What mathematics is optimal for the math/physics curriculum? The answer to the second question is a peak into the future — an introduction to a new mathematical language called Geometric Algebra that integrates algebra, geometry, and trigonometry into a coherent system that simplifies and enhances applications to physics.

References: D Hestenes, Oersted Medal Lecture 2002: Reforming the mathematical language of physics, AJP 71: 104-121(2003). Available at <http://modelingnts.la.asu.edu/>. Information and references on Modeling Instruction at < http://modeling.asu.edu/>.

8:45–9:30 Reception and Social – Dana 111 and Dana 127

9:30- ???? Two-year College Physics Teachers Alliance – Best Western Motel meeting room

Saturday, October 30

7:30–12:30 Registration - Dana Lobby

7:30 Coffee - Dana Lobby

8:00 Invited Talk – Dana 146

Computational (Physics Education) and (Computational Physics) Education Lessons in Applying Interactive Learning Environments

Robert M. Panoff, The Shodor Education Foundation, Inc., Durham, NC, rpanoff@shodor.org, (919) 286-1911, FAX: (919) 286-7876

This talk will serve as an introduction to the Shodor Education Foundation and the resources accessible through its Computational Science Education Reference Desk

(CSERD), a Pathways portal of the National Science Digital Library funded by NSF.

Pattern recognition and characterization are rapidly becoming as important as symbol manipulation in modern science and mathematics, and computational science is at the heart of this development. Two complementary approaches are supported: first, CSERD provides easy navigation tools to find and use numerical models to teach and explore concepts in phsyics; second, CSERD provides high-quality resources for teaching how to build and validate these computational models. Opportunities for further faculty and teacher enhancement, through the National Computational Science Institute's "Computational Physics for Physics Educators" project will be presented.

8:20 Coffee Dana Lobby

Parallel Sessions: A - Dana 146 and B - Dana 153

Session A - Dana 146

8:30–8:45 An electro-optical device of PLZT (9/65/35)

Lei Zhang, Elizabeth City State University, 1704 Weeksville Road, Elizabeth City, NC , Tel: (252) 335-3975, Fax: (252) 335-3508, lei_zhang2002@yahoo.com

A highly refractive and transparent lead – lanthanum zirconate titanate (PLZT 9/65/3) ceramics is optically characterized and PLZT (9/65/35) polarization rotator based 2x2 free space optical switch as one example of PLZT application is reported. The performance of the optical switch are also measured and discussed. This PLZT based optical switch has many advantages over some other polarization based optical switches except around 270 volts operation voltage. An improvement in lower the operation voltage can be achieved by using an isolated DC-DC converter and the results are also discussed.

8:45–9:00 The Boltzmann Factor with Interactive Physics

Thomas A. Dooling, Associate Professor of Physics, Dept. of Chem. and Phys., University of North Carolina at Pembroke, Pembroke, NC 28372-1510, Phone: 910.521.6595, Fax: 910.521.6638, tom.dooling@uncp.edu

Thermodynamics is often introduced to students by having them build small classical systems of interacting particles using Interactive Physics. Interactive Physics can also be used to show how the Boltzmann Factor can predict the velocity distribution of gas particles when combined with phase space. Some computer programs demonstrate this with simulations that track the velocity

distributions of a large number of solid spheres bouncing off each other in a closed box. However, the Boltzmann Factor also gives the velocity distribution of a single particle over a long period of time. So, it can be demonstrated with a simulation that tracks the velocity of one particle. Results from a simulation using interactive physics with as few as 20 particles, in one and two dimensions are shown. They are compared with the theoretical velocity distribution predicted by the Boltzmann Factor.

9:00–9:15 Visualizing Physics

Sharon Schulze and **Beth Snoke Harris**, The Science House, NC State University

The Visualization in Science Education project is engaged in basic research into how graphics and other visiospatial materials are used in science education as well as looking at how to more effectively produce, test, and disseminate these materials to classrooms. We will share our experiences using the VPython programming language with talented high school students to visualize complex physical concepts such as electromagnetic interactions to promote conceptual understanding and as a springboard for inquiry investigations.

The Visualization in Science Education project is funded by the NC GlaxoSmithKline Foundation to support the Mathematics and Science Collaboratory of the Friday Institute. The Science House provides outreach for this project by involving teachers and students in using and developing scientific visualization tools.

9:15–9:30 Learning Efficiently With On-line Homework

Chuck Bennett, UNC-Asheville, Dept. of Physics, Asheville, NC, 28804, (828) 251-6047, (828) 251-6397 (fax), bennett@unca.edu

On-line content for algebra-based introductory physics has been designed to better manage student's study efforts and to reinforce effective problem-solving methods. The strategy uses textbook Example/Exercise pairs where the textbook parameters have been randomized. In the Example, students engage with a detailed solution by submitting intermediate and final results. A follow-up intermediate-level Exercise can be solved with a similar solution strategy - with some algebraic manipulation of the equations that appear in the preceding Example solution. The material is closely integrated with the text, and thus provides better incentives for careful reading. Class testing indicates that this approach is effective at relieving math anxiety, promoting independent thinking, and helping to eliminate unproductive study efforts that students often use with on-line homework.

Session B - Dana 153

8:30–8:45 **Recording Notes During Introductory Physics Lectures. Multi-dimensional interaction.**

Mikhail M. Agrest, Physics and Astronomy Department, College of Charleston, 66 George Street, Charleston, SC, 29424, Phone: 843-953-1359 Fax: 843-953-4824, Agrestm@cofc.edu

The Lectures on Introductory Physics [1-6] were developed as a workbook to complement the computer-generated tool for presentation the material in classroom, based on the idea of multi-dimensional interaction. During the lecture the workbook stimulates students' continuous active participation through listening, discussing and making notes in the provided space and this way completing ideal supplement for their study outside of the classroom.
Presented method provides the opportunity to cover more material in class with the important derivations and correlation of concepts; it saves time for discussion qualitative issues, problem solving, demonstrations, etc.
The teaching-learning effectiveness was increased at the College of Charleston and positive feedback was received from students and faculty at the College and some other Universities.

1-4. M. Agrest. Lectures on Physics, Volumes I-IV, Tavenner Publishing Company, 2002.
5-6. M. Agrest. Lectures on Introductory Physics I & II, Brooks/Cole, Thomson Learning , 2004, ISBN 0759345120 & ISBN 075934583x

8:45–9:00 **When an experiment becomes a discrepant event**

Aaron Titus, Department of Chemistry and Physical Science, High Point University, 833 Montlieu Ave, High Point, NC 27622, (336) 841-4668, titus@mailaps.org

Discrepant events are demonstrations that are purposely counterintuitive and maybe hard to explain. Sometimes an experiment or other hands-on activity unintentionally becomes a discrepant event when the experiment doesn't go as planned. As they say, "If it's biology lab, it's messy; if it's chemistry lab, it stinks; and if it's physics lab, it doesn't work." I'll show some simple resistive circuits exercises that are intended to teach basic ideas regarding series and parallel resistance, yet lead to surprising results.

9:00–9:15 **Why does it stay broken? Examining educational change**

Melissa H. Dancy, University of North Carolina at Charlotte, Department of Physics and Optical Science, Charlotte NC 28223-0001, 704-687-2818, (fax) 704-687-3160, mhdancy@email.uncc.edu

Charles Henderson, Western Michigan University

Consistent with the common belief that college physics instruction needs to improve, a substantial amount of time and money has been spent researching how students learn, developing teaching strategies based on that research and trying to convince faculty to use these strategies. Yet, most classrooms continue to operate without change. High quality research and development is only useful if it is actually used. Therefore, it is essential to consider why adoption levels are lower than expected. In this talk we offer a partial explanation based on interviews with physics faculty and an analysis of the history of educational change. We argue that resources may be more wisely used in understanding and changing the educational situation in which instructors find themselves than in trying to change individual instructors' beliefs and knowledge.

9:15–9:30 **Astronomy in the Hot Seat**

Anthony Crider, Elon University, Campus Box 2625, Elon, NC 27249, 336-278-6268, 336-278-6258 (FAX), acrider@elon.edu

Several approaches have been proposed to inclusively involve all students in classroom dialogue. I recently implemented a policy in which student groups of four answer questions in a "Hot Seat" at the front of the classroom. Each group is assigned two dates in which questions typically addressed to the class are instead directed to the group. An unforeseen by-product of this practice has been improved exam scores. Analysis of the midterm exam showed that students are 9.5±3.2% more likely to correctly answer questions related to material covered while they were in the Hot Seat. A similar analysis of the Astronomy Diagnostic Test revealed that students were twice as likely to learn material they covered in the Hot Seat. One likely reason reported by students is that they typically spent an additional 15-to-60 minutes preparing for class on their two assigned dates

9:30–9:45 Morning Break Dana Lobby

Mid-morning Session – Dana 146

9:45–10:00 **From the Laboratory to the Competition Field: Robotics and Physics**

Angelina Winborne and Chuck Britton, North Carolina School of Science and Mathematics, 1219 Broad Street, Durham, NC 27705, Phone 919-416-2765, Fax 919-416-2955

Getting students fired up about the same old verification laboratory exercises and write-ups can be tough. How do we convince them they can really use physics and that physics and engineering are exciting career options? We have found a solution that works for us—start up a robotics team where the product isn't a set of data and a paper report, but is instead a 130-pound working robot designed and built by students with a strict 6-week deadline! Students see their work come to life and compete with other robots at regional and national games. We will tell how we do it, what the results are, and how you can entice aspiring scientists and engineers with your own team.

10:00–10:30 Invited Talk

Secret Lives of the Hidden Physicists

Gary White, Director, Society of Physics Students, Sigma Pi Sigma Director and Assistant Director of Education, American Institute of Physics, One Physics Ellipse, College Park, MD 20740, 301-209-3013, FAX: 301-209-0839

What is a physicist? A case is made for defining a physicist as anyone with a bachelor's degree (or higher) in physics. Under this definition, a large fraction of physicists are hidden, that is, they have left, or never belonged to, the traditional lot of Ph.D. academicians. Data from the Statistical Research Center at the American Institute of Physics and from a survey of members of the national physics honor society, Sigma Pi Sigma, show the vast array of actual career paths taken by physicists.

10:30–11:30 SPS Poster Session – Dana 111 and Dana 127
(See separate program for this session.)

Late-morning Session – Dana 146

11:30–11:45 **Choice of System and the Energy Equation**

Bruce Sherwood and **Ruth Chabay**, North Carolina State University

An important but neglected topic in introductory mechanics is the effect of the choice of system on the form of the energy equation [1]. If a falling rock is chosen as the system, the Earth does external work +mgh but there is no potential energy, since a single object has no potential energy (the negative of work done by internal forces acting between a pair of objects). If the system includes both rock and Earth, there is no external work but there is an interaction pair (Earth and rock) with associated potential energy whose change is -mgh. Since the human choice of system cannot affect the physical result, both analyses although conceptually quite different lead to the same result for the change in kinetic energy. Lack of clarity on the issues can easily lead to the mistake of double counting, including both work and potential energy in the energy equation.

1. Matter & Interactions I: Modern Mechanics, Ch. 5. Ruth Chabay & Bruce Sherwood, Wiley, 2002, http://www4.ncsu.edu/~rwchabay/mi.

Supported in part by NSF grant DUE-0320608.

11:45–12:00 The Numerical Solution of Few-Body Problems

Wolfgang Christian, Department of Physics, Davidson College P. O. Box 6926, Davidson, NC 28035-6926, (704) 894-2322; fax: (704) 894-2894, wochristian@davidson.edu

The dynamics of objects interacting through a $1/r^2$ force law is of special significance to physicists because it has played an important role in the conceptual history of the mechanical view of the universe. Few theories have affected western civilization as much as Newton's laws of motion and the law of gravitation, which together relate the motion of the heavens to the motion of terrestrial bodies. It is, however, impossible to obtain a general analytical solution for the unrestricted motion of more than two objects interacting under the influence of gravity. This paper describes the numerical solution to gravitationally-interacting few-body systems using the Open Source Physics Java library. Examples of solutions for a variety of standard and non-standard configurations will be presented.

This work has been supported in part by the National Science Foundation (DUE-0126439).

12:00–12:15 Quantitative Astronomy with Consumer Digital Cameras

Donald F. Collins, Warren Wilson College, WWC 6017, PO Box 9000, Asheville, NC 28815, dcollins@warren-wilson.edu

Moderately priced consumer-grade digital cameras, which permit time exposure (up to 15-30 sec), can be used for color astronomical imaging both with and

without a telescope. Applications range from wide field-of-view sky images, color identification of stars, planetary motion, variable star photometry (magnitude and color index), deep sky objects, and lunar images. This type of camera and the associated analytical techniques provide excellent interactive engagement activities for students enrolled in the general education courses of astronomy and physical science. Variable star measurements, color photometry and H-R diagrams, deep sky objects, planetary motion, as well as the camera limitations will be presented. All observations presented were recorded with the Canon A60 digital camera. All analytical measurements and deep sky photographs require image stacking: the alignment and co-adding of multiple time-exposure frames. These are enabled by free software. Color photometry extraction has been accomplished by writing routines in Matlab.

12:15–12:30 **Much Ado About Nothing: A Diversion into Allowable Solutions of the 1-D Schrödinger Equation**

Mario Belloni (Davidson College) and **Laura Gilbert** (Davidson College), Department of Physics, Davidson College PO BOX 6910 Davidson, NC 28035-6910, (704) 894-2320; fax: (704) 894-2894; mabelloni@davidson.edu

Michael Doncheski (Pennsylvania State University), **Richard Robinett** (Pennsylvania State University)

Over the past few years a number of authors have been interested in the time evolution and revival of Gaussian wave packets in one-dimensional wells. We have worked to extend the investigation of wave packet revivals to an asymmetric infinite square well---an infinite well with a constant potential energy "hump" covering part of its base. As we investigated the solution to this problem, we became interested in previously-unreported states of the asymmetric infinite well. In this talk we will discuss these states in the context of the asymmetric infinite well and discuss similar states that appear in other one-dimensional quantum mechanics problems.

This research is supported in part by a Research Corporation Cottrell College Science Award (CC5470) and the National Science Foundation (DUE-0126439).

12:30–1:15 Lunch – Commons

1:15–1:45 NCSAAPT Business Meeting – Commons

Parallel Sessions: A - Dana 146 and B - Dana 153

Session A - Dana 146

2:00–2:15 **Einstein in Cutchogue**

Karl Mamola, Department of Physics and Astronomy, Appalachian State University and The Physics Teacher, Boone, NC 28608, Phone: (828) 262-2440, Fax: (828) 262-7329, mamolakc@appstate.edu

Albert Einstein lived in Princeton, New Jersey, from 1933 until his death in 1955. He took numerous summer vacations during that period in order to rest, get out of the public eye, and enjoy his favorite sport of sailing. Mostly he vacationed in out-of-the-way locations in nearby states such as New York and Maryland. In the summers of 1937 and 1939, Einstein rented a cabin near Peconic Bay in the small New York town of Cutchogue. His months in that community were filled with interesting, humorous, and even historic incidents, some of which will be described in this paper.

2:15–2:30 **Eratosthenes and "The Noonday Project": Outreach at a Local School**

Judy Beck, Department of Physics, University of North Carolina – Asheville (UNCA), Department of Physics, CPO# 2430, UNC Asheville, One University Heights, Asheville, NC 28804, (828) 251-6049, Fax: (828) 251-6397, jbeck@unca.edu

Over 2000 years ago, Eratosthenes determined the circumference of the Earth by comparing the lengths of shadows cast at the same time in two different locations. Today, middle and high school students can conduct a modern version of this famous experiment by participating in The Noonday Project®, designed and facilitated by Ihor Charischak of the Center for Improved Engineering and Science Education (CIESE). (See http://www.k12science.org/noonday/index.html.) Faculty and students from UNCA designed an interdisciplinary unit to support the project and collaborated with Asheville Middle School teachers in presenting the activities to their students. Types of activities included 1) hands-on investigations into relevant geometrical and astronomical concepts, 2) experimental design and data collection/analysis, and 3) communication with other participating schools from around the globe. This presentation will describe the unit and our experiences with the outreach project.

Session B – Dana 153

2:00–2:15 **Outdoor Laboratory Activities for Liberal Arts Physics**

Frederick M. Bingham, University of North Carolina at Wilmington, Department of Physics and Physical Oceanography, 601 S. College Rd., Wilmington, NC 28403, Phone: 910-962-2383, Fax: 910-962-2410, bigkahuna@fredbingham.com

As part of a liberal arts (non-algebra and non-calculus based) physics course, I have developed a number of laboratory activities that are conducted either outdoors, or outside of a traditional laboratory setting. These laboratories emphasize collaborative effort, simple exposition of fundamental physics principles and, most of all, fun. An important aspect of these laboratory activities involves post-lab examination and compilation of the data collected to demonstrate that theories taught in class do not always adhere very well to field-based reality. I will describe some of these labs in detail. For example, we study buoyancy by going swimming. We study rotational kinetic energy by going bowling. We study torque, power and kinetic energy by riding bicycles. Many of the students taking this course will never take another science course. These activities will hopefully convince them that physics plays a role in their daily lives..

2:15 – 2:30 **Resources for Online Astronomy Labs**

Jack Howard, Rowan-Cabarrus Community College, POB 1595, Salisbury, NC 28145, Phone: 704-637-0760, x335, Fax: 704-642-0750, howardj@rowancabarrus.edu

Many colleges now offer astronomy courses online. A number of resources are now available which can be used for online astronomy labs. This paper will review a number of these resources, with suggestions for implementation.

2:30 – 2:45 Dana 146

When Is an Error Not Quite Wrong?

John L. Hubisz, Physics Department, Box 8202, North Carolina State University, Raleigh, NC 27695-8202, (919)362-5782, hubisz@unity.ncsu.edu

Examining textbooks for errors can be awkward. What do you say when a lower level theory teaches one “truth” and a more sophisticated theory says otherwise? As an example, I look at a hierarchy of theories describing optical phenomena and, in particular, the question of the speed of light in various media.

Take Fives – Dana 146

2:45–2:50 **A Demonstration of Tracker: A Java-Based Open Source Video Analysis Tool**

Wolfgang Christian, Department of Physics, Davidson College P. O. Box 6926, Davidson, NC 28035-6926, (704) 894-2322; fax: (704) 894-2894, wochristian@davidson.edu

The *Tracker* video analysis program by Doug Brown at Cabrillo College is being released as part of the Open Source Physics project. Not only does this free video analysis program do an excellent job of plotting and fitting measured video data, it also includes tools for vector representations such as linkable force, net force and motion vectors. This "Take 5" will briefly demonstrate *Tracker's* features and show how it can be used for video analysis tasks such as motion studies and spectral-line profiling.

Tracker can be downloaded from http://www.cabrillo.edu/~dbrown/tracker. For more information on the Open Source Physics project, see http://www.opensourcephysics.org.

2:50–2:55 Physics Photo of the Week

Donald F. Collins, Warren Wilson College, WWC 6017, PO Box 9000, Asheville, NC 28815, dcollins@warren-wilson.edu

Since January 2004 I have been posting a weekly physics photo of interest to our campus. This has arisen mostly out of fun and a mission to show the presence of physics seen in everyday life through photographs and a short description on the Internet. The campus community has responded well to these postings, and they appear to be spreading information about the fascinating world of physics. I invite others to visit the site and to submit photos in digital format. The web site for Physics Photo of the Week is:
http://www.warren-wilson.edu/~physics/PhysPhotOfWeek/Physics%20Photos.html

2:55–3:00 Schlieren Imaging with an Inexpensive PC Web-Cam

Ken Rathbun, Department of Physics, Davidson College P. O. Box 7133, Davidson, NC 28035-7133, (704) 894-2649; fax: (704) 894-2894, kerathbun@davidson.edu

A novel and inexpensive Schlieren video technique, developed by Robert Teese at the Rochester Institute of Technology, has been investigated at Davidson College. Using an inexpensive web-cam, pc and a back-lighted black-striped transparent grid, images of heat plumes from a candle, a propane torch and a match were successfully captured. With the match, a sheath of hot gas can readily be seen around the match-head even after the flame has gone out. When pressurized Freon R134a is released through a nozzle, a vapor jet can be observed which becomes a sinking stream of cold vapor when the flow is terminated. The technique proves to be quite inexpensive and straightforward, opening up many possibilities for student experiments.

3:00	Break	Dana Lobby
3:00 – 5:00	Workshops	Dana 111 and Dana 127

Physlets/OSP: Dana 127 Wolfgang Christian and Mario Belloni will lead a 2-hour workshop which will introduce participants to Physlets and the new Open Source Physics applets and applications. Participants will receive a copy of *Physlets*, *Physlet Physics*, and a CD with Open Source Physics programs.

Tablet PCs: **Dana 111** Dan Boye will lead a workshop on TabletPCs. TabletPCs represent a promising new frontier in educational computing. With pen-based input and robust handwriting recognition in a device that is about the size of a sheet of paper and weighs less than 4 lbs., the form factor is ideal for use in and out of the classroom or lab. The greatest challenge is finding obvious occurrences of real-world phenomena that are not clouded by competing effects, and where simplifying assumptions may be made realistically. This workshop will familiarize the attendees with TabletPC hardware and software and will demonstrate several ways in which they may be used to teach physics.
**** Workshop attendees may check-out the tablets and use them throughout the meeting on Saturday.***

Election

There are no elections held at the Fall meeting. We are accepting nominations for High School Representative and Vice-President for our election in January 2005.

Prizes and Awards

As is usually the case at our meetings, prizes will be awarded for the best undergraduate ($100), graduate ($100) and pedagogical ($150 toward travel expenses to present a similar paper at a national meeting) papers. The best undergraduate award will be given to the best paper or poster presentation at the joint NCS-AAPT/SPS Meeting.

Your mailing label

If your mailing label has LIFE, "2004" or greater, your dues are paid up. Otherwise please send $5.00 along with your registration for each missing year.

E-mail addresses

If you did not receive an e-mail message about this meeting and you have access to e-mail, please send a note to John Hubisz at hubisz@unity.ncsu.edu with your correct e-mail address.

Future Meetings

Duke - Spring 2005, March, Contact Person: Mary Creason
UNC-Pembroke - Fall 2005, October, Contact Person: Jose D'Arruda
Belmont Abbey College - Spring 2006, TBA, Contact Person: Rajive Tiwari

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