

**INSIDE CPS-  
AAPT:**

- Page 1: Spring Meeting Information
- Page 2: Jim Borgardt receives National AAPT award
- Page 2: Meet the current officers
- Page 3: Demonstration for crossed E and B field
- Page 4: Upcoming Events

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# CPS-AAPT Newsletter

Penn State University—York Campus

VOLUME 2

MARCH 23, 2007

## Spring Meeting at PSU-York

*by David Richards,  
President, CPS-AAPT*

The annual Spring Meeting of the Central Pennsylvania Section of the American Association of Physics Teachers, CPS-AAPT, will be held on Friday, March 23<sup>rd</sup>, and Saturday, March 24<sup>th</sup> 2007 at PSU-York Campus.

The meeting will begin Friday with talks starting at 2 p.m., followed by a poster session at 3:20 p.m. and a second round of contributed papers at 4 p.m. The banquet on Friday evening will begin at 6 p.m., followed by a keynote address titled *String Theory and Particle Physics* by Dr. Mirjam Cvetič at 8:00 p.m.

Dr. Cvetič holds the Ray and Eugene Langberg Endowed Chair in high energy theoretical physics at the University of Pennsylvania.



**Dr. Mirjam Cvetič**

A Physics Teaching Resource Agents (PTRA) Workshop on "*Electrostatics*" will be held Friday, March 23<sup>rd</sup>, from 8:30 a.m. to 3:00 p.m.

Saturday morning will begin with an 8:00 a.m. breakfast, followed by a general business meeting at 8:30 a.m. Invited and contributed talks will follow the general meeting.

The Spring meeting will include CPS elections for President, Vice-President, Secretary, Two-Year College Representative, and Treasurer for the coming year. You are welcome to nominate yourself for these positions or to nominate any other CPS member who is *willing to serve*. Contact the current office holders if you have questions about any position.

**Abstract for keynote presentation:**

*We review developments leading to the unification of forces within string theory, with an emphasis on particle physics implications. We introduce extended objects - Dirichlet branes - and highlight a novel role that these objects play in deriving particle physics from string theory. Progress in finding solutions of string theory with Dirichlet branes, that have features of the standard model with three families of quarks and leptons, is reviewed.*

## Jim Borgardt Receives National AAPT Award in Seattle

Dr. James Borgardt was honored as the 2006 SPS Outstanding Chapter Advisor at the 2007 AAPT/AAS Winter Meeting in Seattle, WA. The Award consisted of a plaque and a \$5,000 prize, with \$3,000 going to Dr. Borgardt and \$1,000 going to both the Juniata physics department and the Juniata SPS chapter.

Dr. Borgardt is an Associate Professor of Physics and Society of Physics Students (SPS) Advisor at Juniata College in Huntingdon, PA. He earned his Ph.D. and M.S. in physics from the University of Arizona, and Bachelor of Science degrees in physics and mathematics from the University of California at Santa Barbara. Jim joined the faculty at Juniata in 1998 and has been an advisor and an integral part of SPS at Juniata. His inspiration and leadership are responsible for the chapter's success and current prominence, including its recognition as an SPS Outstanding Chapter for the last eight years in a row.

Dr. Borgardt has a number of publications dealing with ion beam analysis, nuclear reactions, and nuclear microprobes. He has presented at conferences such as the 13th International Conference on Ion Beam Analysis and the 14th International Conference on the Application of Accelerators in Research and Industry. Jim is also a past officer for the Central PA Section of the American Association of Physics Teachers, and a member of the American Institute of Physics, the Council on Undergraduate Research, and the Philosophy of Science Association.



<http://www.spsnational.org/programs/awards/2006/>

## Meet the Current CPS-AAPT Executive Officers

### President 2006-2007



**David Richards**

David Richards is an Associate Professor of Physics at the Pennsylvania College of Technology and has taught physics and astronomy courses there since 1995. He has a B.S. in physics from the University of Mary Washington, a M.S. in physics from the University of Alabama, and is completing a PhD in Instructional Systems at Penn State University.

### Vice President 2006-2007



**Abul Hasan**

Abul Hasan is an Associate Professor of Physics at Penn State York. He received his Ph.D. in Experimental High Energy Physics from Lehigh University in 1980. He did his post doctoral research at University of Wisconsin, Madison for five years before joining Penn State York in 1985. His research interest has evolved in time from the Channeling effects of a single crystal on high energy protons to production of jets in high energy interactions to his current interest in the physics of charmed quark particles.

### Secretary 2006-2007



**John Reid**

Dr. John D. Reid is an Associate Professor of Physics at Lock Haven University and has taught physics there since 1997. He received his Ph.D. in Experimental High Energy Physics from Penn State. Before teaching at Lock Haven, he did his graduate work on Charmonium Spectroscopy at Fermilab, and postdoctoral work on Strange Matter at Brookhaven Lab.

## A Simple Demonstration on Crossed E and B fields for a Magnetohydrodynamic Drive

-by David Richards, Penn College of Technology

This demonstration is a good way to show students how forces act on moving charges in the presence of a magnetic field. The film adaptation of *The Hunt for Red October* popularized the magnetohydrodynamic drive as a caterpillar drive within a Russian submarine. The *Red October* was a stealth submarine that was undetectable because the engine had no moving parts, making it silent and invisible to sonar detection. In reality, the current produced by the electric field would create gases and noise, and the magnetic field would induce a detectable magnetic signature. This demonstration can also be used to explain ion propulsion drives used on some modern spacecraft (such as Deep Space Explorer 1).

### Items specific to this demo (Fig. 1):

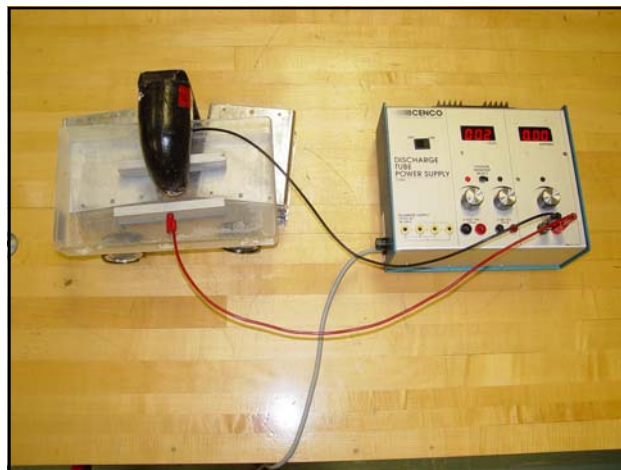
- Powerful horseshoe magnet (1)
- 2 rectangular pieces of aluminum
- Clear plastic tray (1)
- Electrical wire leads (2)
- Salt
- Beaker of water (1)
- Discharge tube power supply or a power supply that can provide several amps of current (1)
- Jack stands (2)



**Fig. 1 Breakdown of Equipment**

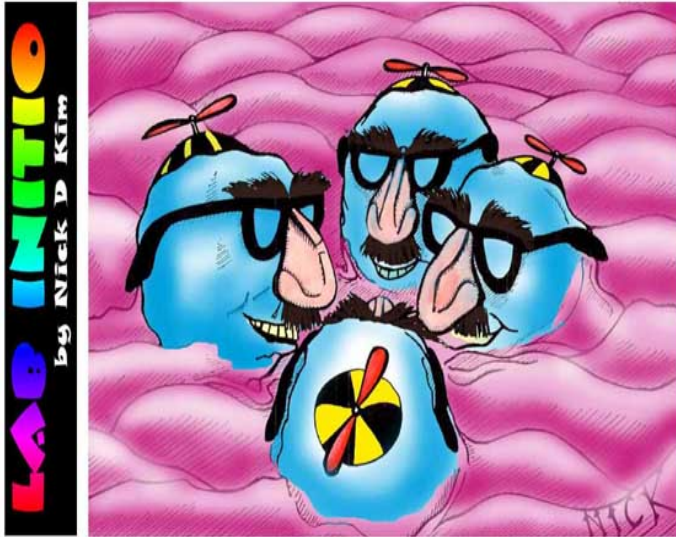
### Procedure:

- Attach a wire lead to each aluminum block and then to the power supply.
- Position the horseshoe magnet with the poles perpendicular to the plastic container (support the magnet with two books or jack stands, as shown in Fig. 2).
- Place the aluminum blocks into the clear plastic container to make a channel between the poles.
- Pour a solution of salt water into the container.
- Gradually increase the current until there is a flow of water between the aluminum channel.
- Sprinkle pepper into the solution to enhance the visibility of the water flow.
- Increase the current to increase the flow rate
- Reverse the leads to change the direction of the flow.



**Fig. 2 Setup of equipment**





AT A RESOLUTION OF  $10^{-24}$  METRES, ISOLATED CLUMPS OF STRANGE MATTER POP BRIEFLY OUT OF THE QUANTUM FOAM TO DEBATE THE POSSIBLE EXISTENCE OF PARTICLE PHYSICISTS.

### CPS-AAPT Section Representative



**Kelly Kriebel**

Kelly Kriebel is an Assistant Professor in the Department of Physics and Earth Science at Moravian College and has taught physics courses there since 1999. He received his Ph.D. from Lehigh University in 1993 and performed post-doctoral research at Florida State University (1993-1995). His research interests include the hydraulic jump, disordered and chaotic systems, and studying magnetic materials using Mossbauer spectroscopy and the magneto-optic Kerr effect.



## CPS-AAPT

*From the CPS-AAPT Constitution...*

The objectives of the Central PA Section of the American Association of Physics Teachers (CPS-AAPT) are to:

- advance the teaching of physics in the colleges and universities of Central Pennsylvania and environs,
- promote a professional spirit and acquaintanceship among the members of the Section, and
- encourage instruction in physics in the secondary schools of the region served by the Section.

### UPCOMING EVENTS:

- **Southeastern PA Section of AAPT Spring Meeting: April 20<sup>th</sup> and 21<sup>st</sup>, 2007 at Swarthmore College**

<http://www.physics.upenn.edu/~aapt/>

- **National AAPT Summer meeting: July 28 - August 1, 2007 in Greensboro, NC**

<http://www.aapt.org/Events/SM2007/index.cfm>

- **The 2008 CPS-AAPT Spring meeting will be held at Lock Haven University.**
- **Gordon Research Conference—Computation and Computer-based Instruction — Bryant University, RI June 8-13, 2008**

*Newsletter compiled by David Richards. Please direct all comments and submissions to [drichard@pct.edu](mailto:drichard@pct.edu)*