



## Meeting Program

### SACS-AAPT Spring 2009 Meeting

University of South Carolina, Columbia SC

March 27-28 2009

**Friday March 27** [Location: Marriot Downtown, 1200 Hampton. See Map below.]

**5:00 pm – 6:30 pm:** Registration

**6:30 pm – 7:30 pm:** Banquet

**7:30 pm – 8:30 pm:** Keynote Speech

**A Solution for Storing Renewable Energy and Producing Transportation Fuels using CO<sub>2</sub>**

**Dr. David Doty, Founder of Doty Scientific, Inc.**

The absence of satisfactory energy-storage solutions has recently led to the increasing availability of low- and negative-priced grid energy in areas with substantial wind energy. Converting the excess off-peak wind energy into storable synthetic liquid fuels should permit complete grid stabilization. Detailed simulations of novel plant designs indicate it should be practical to use available catalysts to synthesize standard fuels, including ethanol and gasoline, from CO<sub>2</sub> and water at system efficiencies approaching 60%. The process is based largely on the commercially proven technologies of wind energy, water electrolysis, and Fischer Tropsch (FT) chemistry. Off-peak low-carbon electricity is used to produce hydrogen. Some of the hydrogen is used in a reverse water gas shift (RWGS) reactor to reduce low-cost CO<sub>2</sub> to CO. The CO and the balance of the H<sub>2</sub> are fed into an FT reactor. Simulations show that major advances can be made in many of the key processes and components, including separation of CO<sub>2</sub> from a complex synthesis gas, cost-effectiveness of heat recuperators, and thermodynamic cycles for conversion of waste heat. With such, the carbon-neutral fuels produced are predicted to be more competitive than advanced biofuels in future economies.

**Saturday March 28 [Location: Jones Physical Science Center. See Map below.]**

**8:00 am – 8:30 am:** Registraton, Coffee and Snacks (PSC Rm 409: Rodgers Room)

**8:30 am – 10:10 am:** Presentations (PSC Rm 006)

**10:10 am– 10:30 am:** Break (Rodgers Room)

**10:30 am – 11:50 pm:** Presentations (PSC Rm 006)

**12:00 pm – 12:45 pm:** Lunch (Rodgers Room)

**12:45 – 1:30 pm:** SACS-AAPT Business meeting (PSC Rm 006)

**1:30 – 2:45 pm:** Workshops (PSC Rms 304, 306)

**Saturday March 28, 2009**

**SACS-AAPT Spring 2009 Contributed Talks Program**

**Jones Physical Science Center Room 006**

**All talks are 20 minutes.**

**8:30 am – 8:50 am**

**Musical acoustics: a gateway for introducing science to non-science majors**

Milind Kunchur

University of South Carolina, Department of Physics and Astronomy, Columbia SC 29208, (803)777-8104.

A literate and modern society requires that all citizens have a least some rudimentary and broad understanding and appreciation for science and the scientific method. Even for those who will graduate from college, some (non-science) degrees require only that they take one science course. This single course must pack the required broad punch while being palatable, and even delicious and attractive, to a non-science major college student. Musical acoustics is a vehicle that fits this bill. It covers an incredibly diverse set of topics that not only introduce them to all the basic concepts of physics and some new math, but also to electronics, biology and other disciplines in science and engineering. It makes practical connections to their everyday life and welfare, and lends itself well to a variety of demonstrations. In this talk I will discuss some of the research and teaching approaches I use for conveying science to non-science majors.

**8:50 am – 9:10 am**

## **Building Introductory Honors Courses in a Small Physics Program**

J .B. Sharma

Department of Physics, Gainesville State College, Gainesville, GA 30504, (678) 717 3812.

[jsharma@gsc.edu](mailto:jsharma@gsc.edu)

An Introductory Honors Physics Course sequence was taught for the first time at Gainesville State College (GSC) this year. Currently the honors program is restricted to students in the calculus based introductory courses only, of which two sections are offered every semester. The enrollment in the honors physics courses is not high enough (<10) to justify offering a separate honors physics section. In order to get honors credit, students enrolled in the introductory course meet for an additional 1.5 hours a week for additional instruction and activities. Students have to qualify for the GSC Honors program to be able to enroll in the honors physics courses. The honors physics courses have a lot of emphasis on projects, which includes students working on projects of interest to local industry. Programmatic and curricular issues with such an honors physics program will be discussed.

**9:10 am – 9:30 am**

### **Using Mastering Astronomy website to teach introductory astronomy in both courses with scheduled class meetings and in Independent Learning (IL) courses.**

John L. Safko, Distinguished Professor Emeritus

University of South Carolina, Department of Physics and Astronomy, Columbia SC 29208, (803)777-8104.

[safko@sc.edu](mailto:safko@sc.edu)

During the academic year 2007-8 and Fall 2008 introductory SCHC one semester astronomy courses for non-science majors were taught using Pearson's Mastering Astronomy web site to assign and grade homework and exams. During the same time period an Independent Learning course was converted to use the same source material. Details of the web site its advantage and disadvantages and use will be discussed. I used the Essential Cosmic Perspective 4<sup>th</sup> Ed by Bennett, et. al. The IL course is currently being revised to the 5<sup>th</sup> Ed.

The site also supports Mastering Physics and Mastering Chemistry.

**9:30 – 9:50**

### **Reflections on a Three Year Project, Restructuring Introductory Physics at Georgia Southern University**

Delena Bell Gatch

PO Box 8031, Department of Physics, Georgia Southern University, Statesboro, GA 30460.

912-478-7354

[dbgatch@georgiasouthern.edu](mailto:dbgatch@georgiasouthern.edu)

Despite efforts to engage students in the traditional lecture environment, faculty in Georgia Southern University's Physics Department became dissatisfied with lecture as the primary means of instruction. During the 2006-2007 academic year, Georgia Southern University's Physics Department began adapting the studio physics model to suit the needs of calculus-based physics students at Georgia Southern University. A studio course seamlessly integrates the lecture and laboratory courses into one course, devoting much of the class time to active, inquiry-based learning. An emphasis was placed on replacing traditional lectures with interactive, technology enriched class periods designed around the various learning styles. New teaching materials were created so that old laboratory assignments, previously very "cook-book" in nature, could be replaced with new inquiry based laboratories relying on web-based computer simulations and computer interfaced laboratory apparatus. Classroom response systems and

online homework systems have been incorporated into the studio model. Assessment indicates students enrolled in the studio physics courses experience greater success in achieving the desired learning outcomes for the introductory physics courses. As of Fall Semester of 2008, all sections of the calculus-based physics courses at Georgia Southern University are being taught utilizing the newly adapted studio model.

### **9:50 – 10:10**

#### **A Lecture Notes Supplemental Workbook for Introductory and General Physics.**

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](mailto:Agrestm@cofc.edu)

Writing the lecture notes became a way of comprehending, a mode of active participation in the learning process. Creating Useful Notes is now the most popular seminar topic in the Study Skills Improvement series at the Centers for Student Learning. The advance in lecturer's teaching tools makes notes writing a real challenge. To address the issue, the workbooks for making lecture notes at the Introductory Physics and General Physics classes were developed. [1-4]

Most of the graphical and mathematical materials of the teacher's PowerPoint Presentation are reproduced in the hardcopy of the workbook, providing space for students' notes. The workbook implements the idea of multi-dimensional interaction in classroom [5].

Making notes is not distracting the students, but on the contrary, it stimulates students' continuous active participation through listening, discussing and completing an ideal supplement for their study outside of the classroom.

These workbooks became a powerful supplement for the students especially for those with dyslexia and other similar learning disabilities.

1-4. M. Agrest. Lectures on Introductory Physics I&II. Revised; General Physics I&II (Calculus Based). ISBN 0-759-35047-7; 0-759-36060-X; ISBN 1426625596 & ISBN 0-759-39304-4 Thomson Learning, 2005- 2007.

5. M. Agrest. "Multi-Dimensional Interaction in Physics Classroom Activity", TPT. Submitted 2008.

### **10:10 – 10:30**

**Break (Rodgers Room- PSC Rm 409)**

### **10:30 – 10:50**

#### **The IQRECTM Educational Environment**

Joseph E. Johnson

University of South Carolina, Department of Physics and Astronomy, Columbia SC 29208, (803)777-8104.

[JEJOHNSON@asg.sc.edu](mailto:JEJOHNSON@asg.sc.edu)

We have designed and developed a powerful new educational software environment that consists of three primary components: (a) Students all sign onto the IQRECT web site during class, or other activity, using any form of wireless device (netbook, laptop, web enabled phone, iPhone, etc) and submit responses to all class questions and queries from the instructor. The system thus mandates total engagement and effectively provides 1-on-1 instruction in large classrooms. (b) IQRECT performs very extensive data management, tracking, and analysis thus automatically freeing teachers from extensive data entry, management, reporting and analysis for: attendance/tardy,

homework, class responses, exams, demographic and polling data, standardized tests, labs, recitations, field trips, merits/demerits, keystroke & error rate analysis, and other statistical analysis with advanced proprietary metrics. (c) IQRECT contains special algorithms for estimating the answers to questions with a unique single word string or numerical value responses. This utilizes a self-consistent solution to nonlinear coupled equations thus instructors need not enter the answer. Optionally the instructor can simply select the correct response from student submissions with a mouse click from their on-line laptop.

IQRECT also (d) removes the constraint of having to create wrong answers for multiple choice; (e) allows (or not) an automated spelling correction of the response; (f) provides optional use of unit conversion and management as well as physical constants; (g) allows adjustable weights of scoring for activity components (e.g. homework), (h) sends email of exams, and daily class performance to each student (and to parents for K-12), (i) provides easy to use import-export to excel type files, (j) allows the responses from a question to be resent to students as a multiple choice version of the question, and finally, (k) contains means for grading complex and extended responses along with rating metrics for the value of questions.

IQRECT continues to be tested in USC Physics classes and a K-12 private school.

**10:50 – 11:10**

**The Physic Source, a digital library for teachers of introductory physics**

Taha Mzoughi

Dept. of Biology and Physics, Kennesaw State University, 1000 Chastain Rd., #1202, Kennesaw, GA 30144-5591.

(678) 797 2152

[tmzoughi@kennesaw.edu](mailto:tmzoughi@kennesaw.edu)

Teaching introductory physics can be enhanced and made easier if faculty can easily find and share teaching resources. The Physics Source (<http://www.physicssource.org/>), a component of ComPADRE, is designed for that specific purpose. It is a web resource that faculty can use to find, share, and collaborate on building high-quality, effective teaching and learning materials. Content is not included in the library until verified by editors. Since the library is focused on just introductory physics content, Source searches result in faster matches and added opportunity to discover relevant related content. Additionally, the Source enables the users to organize the content they like, and to submit their own resources. The Source and ComPADRE are a joint project of the AAPT, AAS, APS, and SPS. The Physics Source and ComPADRE are sponsored in part by the National Science Foundation (DUE 0532798).

**11:10 – 11:30**

**New Physics Toys**

Ronald Edge

University of South Carolina, Department of Physics and Astronomy, Columbia SC 29208, (803)777-8104.

[edge@physics.sc.edu](mailto:edge@physics.sc.edu)

Toys can often contain subtle and fascinating examples of physics in action. A collection of interesting physics toys will be demonstrated and analyzed.

**11:30 – 11:50**

**Confronting Un-Popular Science Reading in Secondary Education**

Craig Wiegert

Department of Physics & Astronomy, University of Georgia, Athens, GA 30602-2451.

(706) 542-4023

[wiegert@physast.uga.edu](mailto:wiegert@physast.uga.edu)

[cwiegert@uga.edu](mailto:cwiegert@uga.edu)

Popular science books are often at the top of the non-fiction best seller list. Why? Some are there because of their "gee-whiz factor" to be sure, but many are simply excellent reads. Would most students consider a middle or high school physical science textbook to be a "good read"? Probably not. This is not surprising, as those texts are written and developed basically to pass along concepts and information that conform to state mandated curriculum standards. Popular science books are written instead to capture the imagination (although the content may be incorrect or imaginative). To achieve long-term gains in the number of students who eventually pursue STEM careers, we need to develop not only competency in science, but also genuine delight and fascination with STEM subjects. The Physics Learning Community at UGA will present their preliminary efforts to directly incorporate popular science writing into middle and high school science curricula. Popular science books that are considered excellent reads have been identified, and selected chapters or passages judged for correct, age appropriate science content. Our hope is to develop a catalog of readings that teachers can use to stimulate interest in the physical sciences.

**12:00 – 12:45**

**Lunch (Rodgers Room- PSC Rm 409)**

**12:45 – 1:30**

**SACS-AAPT Business Meeting (PSC Rm 006)**

**1:30 – 2:45**

**(PSC Rm 304)**

**Workshop I: "Midway Physics."**

David Tedeschi

University of South Carolina, Department of Physics and Astronomy, Columbia SC 29208, (803)777-8104.

[tedeschi15lnc@gmail.com](mailto:tedeschi15lnc@gmail.com)

Midway Physics Day is an opportunity to provide students a chance to experience forces as well as describe them with the concepts of force and motion. This daylong experience helps dispel common misinterpretations that involve the application of Newton's Laws of motion.

This workshop will involve a short presentation on understanding forces through Midway Day which will be followed by a hand-on activity using accelerometers and barometers. The workshop will end with a discussion of the different Midway Day exercises that are used to reach students with different levels of scientific background.

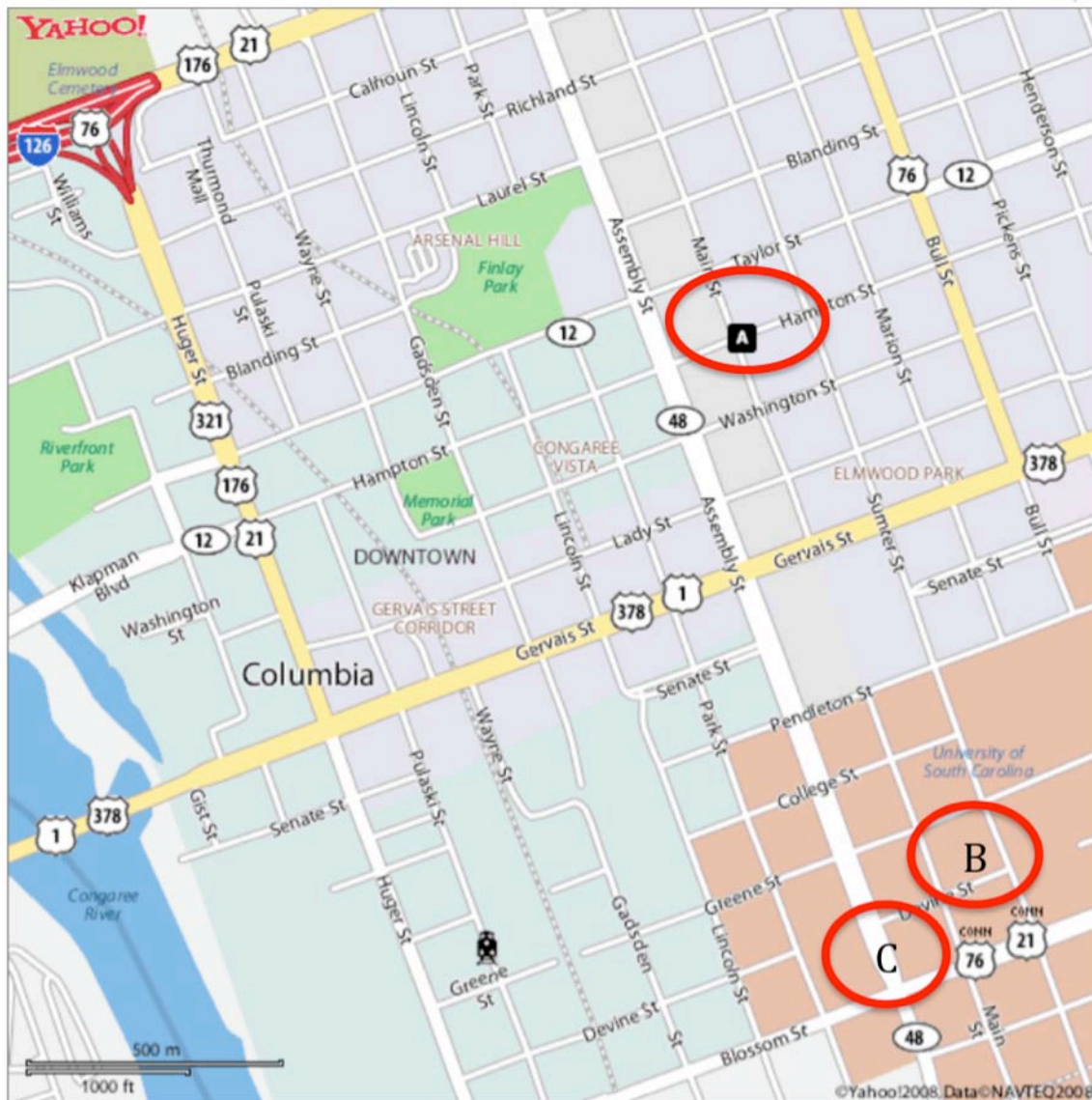
**(PSC Rm 306)**

**Workshop II: "Introduce Computer Modeling in Your Classes with VPython"**

Craig Wiegert

Many college physics programs incorporate some computer-based work into the upper-level curriculum, perhaps through dedicated (and expensive) software packages like Mathematica, Maple, Matlab, and LabVIEW. Projects such as the Chabay and Sherwood "Matter and Interactions" curriculum have shown that physics students can benefit from even earlier exposure to computer modeling. This workshop will introduce participants to programming in Python, a popular and freely-available modern high-level language, designed to have a gentle learning curve. VPython (the Python language combined with the Visual module) provides an easy way to generate 3-D navigable displays and simulations even for programming novices, yet still has considerable power and flexibility for experts.

Map of 1200 Hampton St, Columbia, SC 29201-2826 **YAHOO!** LOCAL Maps



“A” is the location of the banquet, which is being held at the Marriot Columbia- 1200 Hampton St. This is on the corner of Hampton and Main. After 5:30 pm, parking at meters is free. A municipal parking garage (entrance on Sumter St.) is right next to the Marriot. Parking is free if you leave the garage after 7:30 pm.

“C” is the location of the Marriot Courtyard Columbia Downtown at USC (conference hotel). They have parking on premises for guests. Entrance is on Assembly St.

“B” is the Jones Physical Science Center. Then main entrance is at 800 S. Main St. Signs will direct you to the proper rooms. All metered parking is free on Saturday.

The easiest route into Columbia is to take I126. I126 turns into Elmwood Ave. Turn right onto Assembly St.

**Note: the fees have been reduced.**

**Registration Form**  
**SACS-AAPT Spring 2009 Meeting**  
**University of South Carolina**

Name : \_\_\_\_\_

Address: \_\_\_\_\_

Email: \_\_\_\_\_

**Registration Fee**

Banquet Dinner + Saturday Lunch: \$25

Banquet only: \$16

Saturday Lunch only: \$13

**Membership Dues**

University Faculty: \$5

High School Faculty/ Student: \$0

Total enclosed: \_\_\_\_\_

Bring this form with you and pay at the meeting.

Address checks to SACS-AAPT.

Please email Jeff Wilson at [jwilson@sc.edu](mailto:jwilson@sc.edu) if you plan to attend.