



**Southern Atlantic Coast Section
of the
American Association of Physics Teachers
(SACS-AAPT)**

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Contributed papers Abstracts

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The Term Paper: An Aspect of Writing Across the Curriculum

Over the past nine years, students in my courses were given an assignment to write a term paper. The paper topics chosen by the students were mostly from physics, although topics from related disciplines were not discouraged. Some of the students' essays were published in the college's student magazine, "Mariners' Log", to the mutual benefit of the students and the publication. In the presentation I outline how requiring this assignment started and some of its apparent merits.

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Nanoscience by Telecollaboration

Gainesville State College (GSC) has partnered with Clark Atlanta University (CAU) to bring Nanoscience to the undergraduate classroom. An Atomic Force Microscope (AFM) resident in the graduate Chemistry program at CAU is accessed and operated remotely by undergraduates at GSC to image nanostructures. Examples of demonstrations and student projects will be presented along with plans for a Nanoscience outreach by tele-collaboration. The lessons learned in this ongoing project will also be discussed.

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Attempting to Improve Retention Rates in Intro Physics

Physics usually has one of the worst retention rates on any campus. Studio physics has been one strategy used to address the retention rates in physics courses while maintaining the rigor. Studio-style physics courses combine lecture and lab while using a variety of manipulatives to enhance the learning. The results from the PRISM-funded research will be given.

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Hands-On Astronomy: Day and Night:

Hands-On Astronomy no longer requires direct access to the night sky. I will describe several curricula developed for use in the classroom including Hands-On Astrophysics from the American Association of Variable Star Observers and the Hands-On Universe from the Lawrence Hall of Science. Hands-On Astrophysics uses archived observations of variable stars to introduce students to concepts in astronomy, data analysis, and statistics. Additionally guidance is provided to students and instructors in techniques of making visual observation of the brightness variations of variable stars. On the other hand, Hands-On Universe is a program to introduce students to image processing using a variety of astronomical images. Classes may also request Hand-On Universe observers to obtain images of objects they specify. . This work is supported in part by NSF grants #AST-0071260 and AST-0507551 to the College of Charleston

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Recurrent Studies in Physics Labs

The Recurrent method of studying a phenomenon or a device enhances learning process, excites students with the visualization of the results of their work. Based on a hypothesis or on an accepted theory, students examine the phenomenon in the forward performed study to use results of direct measurements to calculate unknown parameters. In the backward study students use the magnitude of those parameters to predict measurable parameters. Precision of the prediction depends on the quality of the results of the forward performed experiment. Visual assessment of students' prediction of the results emotionally involves students and makes learning process more effective.

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Invited paper
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Optical Methods for Determining Glucose Concentrations (An Undergraduate Research Project)

For those with diabetes monitoring glucose levels is critical and the current monitoring methods are invasive. Exploiting optical properties such as the index of refraction of the glucose may lead to alternative monitoring techniques. For the first method, a NIR laser (830nm) illuminated the sample and the reflectivity was determined. This was then used to calculate the index of refraction using Fresnel's equations. A second method used interference to determine the index of refraction. A HeNe laser (633nm) and a solid state diode laser (532 nm) were used as the sources in an interferometer, where the samples are rotated through a given angle and the interference fringes are counted and then correlated to the index of refraction. The index of refraction using these two methods is concentration dependent.

20 Years of Physics Education Research - What have we learned? Part 1

From Robert Millikan at the turn of the last century, through the post-Sputnik era through today, every few decades sees a call for physics teaching reform, based on disappointing results in student learning. One of the advantages of being a physics instructor today is that we now know a lot more about the mental processes that go on during learning. Advances in neuroscience and research into cognitive development have allowed us to better answer to the question: "How can we teach students effectively?" This presentation will summarize the findings of this research as it pertains to physics teaching, in the form of principles that must be addressed to ensure that students learn physics well.

20 Years of Physics Education Research - What have we learned? Part 2

As detailed by the first part of this presentation, one of the advantages of being a physics instructor today is that we now know a lot more about the mental processes that go on during learning. Advances in neuroscience and research into cognitive development have allowed us to better answer to the question: "How can we teach students effectively?" This presentation will take the abstract principles given in the previous talk and apply them to actual methods of teaching physics, detailing some various models that have been proven to work well, and giving some results from courses taught at Coastal Carolina University.

The International System of Units (SI) —

From Start to (near) Finish

The International System of Units (SI) traces its ancestry to the first metric system of the 1790s, an international treaty signed in 1875, and official formulation in 1960 and 1961. The United States has been involved in this process since the early 1800s. The U.S. Congress declared the metric system to be legal in all business and court dealings in 1866 and to be the preferred system of measurement in 1988. U.S. basic measurement standards went metric in 1893 and the federal government undertook complete metrication of itself in 1991. Thus the SI has basis and standing in both international and U.S. law. We continue to play a key role in refinements of the SI. I will briefly describe the SI and its administrative structure. I will comment also on metrication progress in the U.S. and anticipated SI refinements.

Astronomy Laboratory Exercises for Non-science Majors.

Project CLEA: Contemporary Laboratories in Astronomy - what is old, what is new, and what is the "Final Frontier"?