



Indiana Section of the
American Association of
Physics Teachers

April 22, 2011

Registration: 5:00 - 6:30 pm

Virtual Laboratory Workshop: 5:30 - 7:30 pm (H206)

Tour of Plainfield High School 5 - 7 pm (2nd floor atrium)

Demo Derby "Show and Tell" : 6:45 - 7:45 pm (H204)

April 23, 2011

Registration: 8:00 - 10:00 am

Breakfast snacks (2nd floor atrium)

Opening Remarks: 8:20 am (2nd floor atrium)

Sessions: 8:30 am - 11:15 am

(H204, H205, H206)

Lunch: 11:30 - 12:30 pm

Keynote Speaker: 12:15-12:45

Business Meeting/Award Presentation: 1-1:45 pm

(2nd floor atrium)

Business Meeting/Award Presentation: 1-1:45 pm

(2nd floor atrium)

Plainfield High School
1 Red Pride Drive
Plainfield, Indiana 46168
(second floor)

Parking: front lot and enter through Door 1

Friday Evening Activities 4/22/11

Location: Plainfield High School

Virtual Laboratory Workshop (5:30-7 pm in H206)

In the fall of 2005, Stacy McCormack began teaching online science courses for Ivy Tech Community College. One of the greatest challenges in teaching online was how to incorporate lab experiences with students who were not located anywhere near a lab and who did not have lab equipment on hand. Stacy found online java labs as the key to providing lab ry soon after, Stacy began using the online labs in her high school traditional physics course as well. Stacy will share all of her virtual labs with you, and hopes that you will do the same! Come with websites and virtual labs that you use in your various levels of physics/ physical science courses. Together we will create a document full of online resources that individuals have used with success in various levels of physics courses. Please come willing to share and willing to learn!

Contact Information

Stacy McCormack
Penn High School Physics Teacher & A Matter of Science,
LLC
smccormack@phm.k12.in.us

Demo Derby “Show and Tell”

(6:45-7:45 pm)

Bring your favorite demonstration to share with the INAAPT group during this informal gathering.

Friday Evening Activities 4/22/11

Location: Plainfield High School

Tours of Plainfield High School (5 - 7 pm)

Meet in 2nd floor atrium

Contact Information

Tracy Hood
Plainfield High School
thood@plainfield.k12.in.us

Session A - Talk 1

Time: 8:30 am to 8:50 am

Location: Plainfield High School H204

Title

Building a Centripetal Acceleration Model from Uniform Circular Motion

Abstract

It is necessary for students to have a solid understanding of the constant velocity equation before they can comprehend linear acceleration. Similarly, with circular motion the equation relating radius, period, and speed for must come first conceptually. Students attach a toy car to a ring stand with a long string, and the car traces out a circle. They calculate the speed of the car and create a motion map complete with instantaneous velocity vectors and graphically computed acceleration vectors. Only after students have mastered the concepts involving the directions of the various vector quantities is the centripetal acceleration formula derived.

Contact Information

Craig Williams
Northwestern High School
craig.williams@nwsc.k12.in.us

Session B - Talk 1

Time: 8:30 am to 8:50 am

Location: Plainfield High School H205

Title

Designing Physics Projects for the 21st Century

Abstract

Projects have always been labor-intensive for the teacher as well as the student. While beneficial to the student, teachers often feel that the effort just isn't worth the time. This session will demonstrate two technology resources beneficial to teachers who would like a unique way for their students to do research for their projects while not requiring the teacher to spend hours just in preparation. These resources, Trackstars and webquests, will also give teachers the ability to spend less time with the tedious aspects of creating and grading projects. These resources also allow students to become more independent since they will also help make research robust and interesting. Both resources will be demonstrated using past projects; other projects will be given out that can then be converted to this format.

Contact Information

Elaine Gwinn
Shenandoah High School
jgwinn@shenandoah.k12.in.us

Session C - Talk 1

Time: 8:30 am to 8:50 am

Location: Plainfield High School H206

Title

An Instrumentation Course for Teachers.

Abstract

A summer course in instrumentation is being offered by the IU Bloomington Physics Department. The course is directed towards high school physics teachers and will provide hands on experience with state of the art instrumentation and software. Emphasis will be on developing applications that can be used in the high school physics classroom. The course will run this summer from June 31st to July 22nd. Although some knowledge of electronics is recommended, the course is open to any physics teacher who has taken the first year calculus based physics sequence (or equivalent). Students taking the course will use National Instruments Lab View Software along with GPIB controlled electronic test equipment including a digital oscilloscope, function generator and analog to digital interfacing system. Equipment can be checked out and taken home. Students completing the course will be given credit equivalent to P350 Applied Physics Instrumentation Laboratory. The talk will provide details of the course, give examples of the types of applications that can be developed and provide information

Contact Information

Dan Beeker
Indiana University
Bloomington, IN
debeeker@indiana.edu

Session A - Talk 2

Time: 8:50 am to 9:10 am

Location: Plainfield High School H204

Title

Charger Castles: Projectiles with a twist.

Abstract

How many points can be scored—and how many students can be engaged in a class competition that goes beyond calculating range.

In this exercise, using Pasco mini-launchers, students compete for points in a tournament by calculating the placement of their opponents' castles, marking position with carbon sheets.

Contact Information

John Taylor
Elkhart Memorial High School
jtaylor@elkhart.k12.in.us

Session B - Talk 2

Time: 8:50 am to 9:10 am

Title

MPG Equivalent Economy Labels for New Electric Vehicles

Abstract

Official EPA fuel economy stickers for new electric and hybrid vehicles provide consumers quantitative mileage and environmental data for comparing new vehicle performances. The EPA miles-per-gallon-equivalent (MPGe) calculation utilizes only on-board energy supplies and omits the impacts of important upstream factors such as electrical power plant and distribution efficiencies. In this paper, the label information is reviewed and the calculations and resultant high MPGe values for example vehicles are discussed. The EPA results for particular label charging routines are evaluated. Speculations on consumer conclusions and a return-on-investment analysis for a consumer buying a new hybrid are presented. Suggestions are given for physics student exercises or class activities based on this real-world, modern issue.

Contact Information

David R. Ober
Ball State University
dober@bsu.edu

Session C - Talk 2

Time: 8:50 am to 9:10 am

Location: Plainfield High School H206

Title

Teaching to Teach—Adopt a Student Teacher!

Abstract

Hall pass regulations, resource room accommodations, cheating consequences, and school politics—these are all things that are second nature to a seasoned teacher, but pre-service teachers have no idea how to handle. The biggest issue with topics such as these is that this information cannot be taught in a classroom. Each individual teacher learns their own style eventually, but a new teacher can be overwhelmed by all of this—the only way he or she is going to learn is by student teaching with a confident, enthusiastic teacher. I would like to share a bit of my wonderful experience as a student teacher this semester and encourage teachers to share their experience and excitement for science with a whole new world of students

Contact Information

Rachelle Klinger
Physics Teaching, Purdue University
Student Teacher, Clinton Central High School
rachelle.klinger@gmail.com

Session A - Talk 3

Time: 9:30 am to 9:50 am

Location: Plainfield High School H204

Title

How 'springy' is a Resonance Apparatus?

Abstract

There is a commercial resonance apparatus with three pairs of rods, each pair of a different length. When one of the long rods (slender spring steel, with a small section of wooden dowel rod on top) is excited, the other long rod begins to vibrate but the other rods do not. We attached a small (11 g) mirror to a rod and reflected a laser beam off it, then watched the spot on the wall. When the rod was excited, there was a 'length' of the reflected spot as it traveled. We measured the decay of this spot with time, and found out how 'springy' each rod was. (We found the 'Quality Factor Q of each rod).

We also mounted the apparatus on a long board, driven at one end by a wave driver, and traced out the resonance curve of a rod. The Q values were 320, 290, and 230 for the longest, middle, and shortest rods respectively.

Contact Information

Michael Moloney
Rose-Hulman Institute of Technology
Terre Haute, IN 47805
moloney@rose-hulman.edu

Session B - Talk 3

Time: 9:30 am to 9:50 am

Location: Plainfield High School H205

Title

The End of Class Pass Phrase and Other Literacy Strategies for Struggling Students.

Abstract

In my work with Project Alianza, I have found a number of strategies that I use to target Physics vocabulary. For many of our students in a first physics course, vocabulary is a major stumbling block. Our “end of class pass phrase: has had success in our limited trial. We will share some ideas that we will be implementing in these final weeks off this year and throughout next year’s course.

Contact Information

Peter Berg
Decatur High School
pberg@msddecatur.k12.in.us

Session C - Talk 3

Time: 9:30 am to 9:50 am

Location: Plainfield High School H206

Title

Learning from Unexpected Results: Samantha's Third Grade Levers Experiment

Abstract

Unexpected results in science experiments can lead to effective learning experiences by students at all levels. The mismatch between expected relationships and actual experimental trends may be caused by the absence or lack of attention to statements of model assumptions. Follow-on modeling with relaxed assumptions aids student understanding. To illustrate these assertions in practice, we present the saga of third-grader Samantha's Science Fair Project. Experimental work was focused on measurements of the mechanical advantage of a first class lever. Surprising results, apparently contradicting the textbook, led to a closer look at assumptions. A new model was developed to explain the data. Encountering and resolving dramatic deviations from expected results requires students to exercise their critical thinking skills and serves as an effective instructional tool.

Contact Information

Ronald Cosby
Department of Physics and Astronomy
Ball State University
rcosby@bsu.edu

Session A - Talk 4

Time: 9:50 am to 10:10 am

Location: Plainfield High School H204

Title

Measurement and Uncertainty the GUM Way

Abstract

Beginning in 2007, our Department adopted in all of its laboratories for physics and science majors the *Guide to the Expression of Uncertainty in Measurement* (GUM) approach to handling measurement uncertainties advocated by Buffler, et al. [*The Physics Teacher*, Vol. 46, 539-543 (2008)]. I'll describe what we did and how it has been working.

Contact Information

Dennis E. Krause
Department of Physics
Wabash College

Session B - Talk 4

Time: 9:50 am to 10:10 am

Location: Plainfield High School H205

Title

Detection in Muncie, Indiana, of the Fukushima Nuclear Reactor Releases Following the Japanese Earthquake

Abstract

On March 11, 2011, Japan experienced the most powerful earthquake to hit their country. This 9.0 earthquake off the coast of Japan created a tsunami that along with the earthquake caused the loss of power from electric generators; this in turn caused the failure of reactor cooling systems, explosions, and leaks of radioactive gas. The loss of cooling water also caused spent fuel rods to overheat and release radioactive materials into the atmosphere. The easterly spread of radioactivity released into the atmosphere from the Fukushima reactors was first detected in Alaska, then along the west coast of the United States. Measurements taken in Muncie, Indiana, showed several days of increasing levels of I-131 and Cs-137 to maximum levels of approximately 0.1 pCi/cubic meter and 0.001 pCi/cubic meter, respectively, followed by subsequent declines. The results will be compared background radiation levels and to similar measurements taken in Muncie, Indiana, following the 1986 Chernobyl accident.

Contact Information

David R. Ober
Ball State University
dober@bsu.edu

Session C - Talk 4

Time: 9:50 am to 10:10 am

Location: Plainfield High School H206

Title

Physics Olympics at Noblesville High School

Abstract

For the past 20+ years, the Physics Olympics has been a major component as a near-the- end-of-the-year field trip activity for Physics 1 students at Noblesville High School. It has become a major physics-publicizing event at NHS. This presentation will outline some of the planning and some of the specific activities where the students apply some of their physics concepts to do a variety of event challenges. Sample activities and schedule will be distributed. Time permitting, videos of some of the activities may also be shown.

Contact Information

Charles Emmert,
Noblesville High School
Charles_Emmert@nobl.k12.in.us

Session A - Talk 5

Time: 10:30 am to 10:50 am

Location: Plainfield High School H204

Title

Another Use for 3D

Abstract

3D technologies like Visual Python are mostly used to visualize time evolution of 3D objects in real space. Another possible use is to visual mathematically complex objects evolving in 1D space. An example developed here is a 3Drepresentation of 1D quantum wave functions using visual python. Several cases are studied from simple propagating waves, infinite square well superpositions as well as gaussian wave packets in quadratic and "square" potentials.

Contact Information

Steve Spicklemire
University of Indianapolis
spicklemire@uindy.edu

Session B - Talk 5

Time: 10:30 am to 10:50 am

Location: Plainfield High School H205

Title

***Advanced Lab Experiment: Pulse Nuclear
Magnetic Resonance***

Abstract

An advanced laboratory experiment using pulse NMR is described. The proton resonance in water containing paramagnetic ions was studied. The proton's magnetic moment and spin lattice relaxation time were measured using appropriate pulse sequences. Agreement with accepted results is excellent.

Contact Information

Gifford Brown
Physics Department, University of Evansville
gb8@evansville.edu

Session C - Talk 5

Time: 10:30 am to 10:50 am

Location: Plainfield High School H206

Title

Don't Buy this Book!!!!!!

Abstract

Many novice physics learners purchase popular self-study tutorial books at local bookstores in order to supplement instruction they get in the classroom and hopefully raise their course grades. However, what they “learn” from these books may actually lead to greater confusion and result in lower course grades. This session will provide shocking excerpts of physics principles as described by one of the more popular self-help books – *Physics For Dummies*.

Contact Information

Joel A. Bryan, PhD
Department of Physics and Astronomy
Ball State University
jabryan@bsu.edu

Session A - Talk 6

Time: 10:55 am to 11:15 am

Location: Plainfield High School H204

Title

Micro Roentgen Radiation Monitor

Abstract

The presenter will discuss the development and use of AWARE Electronics Model RM-60 Pro interfaced with an Arduino Duemilanove microcontroller. The purpose of the project is to develop an inexpensive radiation monitor that is portable and can be deployed on high altitude balloon. The technique could be used by college or high school teachers wanting to explore radioactivity in the classroom.

Contact Information

Timothy A. Duman
University of Indianapolis
tduman@indy.edu

Session B - Talk 6

Time: 10:50 am to 11:15 am

Location: Plainfield High School H206

Title

The Quantum Dilemma

Abstract

Thirty years after EPR we are confronted by Bells Theorem in recognition of which we are told we must choose either to give up the idea that particles have definite yet unknown spins, positions, and momenta before they are measured; or, we must assert that all particles of the universe are connected by instantaneous communication links. This is sometimes stated as that there are no hidden variables in Quantum Mechanics. Search for "Hidden Variables" is the desire for determinism to prevail and dispense with the dichotomy of the classical and quantum world. # Einstein did not endorse hidden variable theory—he favored the approach such that something analogous to what his theory had done in supplanting Newtonian gravitation would EVENTUALLY accrue.#

Contact Information

Jonathan Brooks
Ivy Tech
j.o.brooks@att.net

Session C - Talk 6

Time: 10:50 am to 11:15 am

Location: Plainfield High School H206

Title

Abstract

I would like to share my experiences as an Research Experience for Undergraduates (REU) participant. As an REU, I developed a set of 5 units submitted to Teachengineering.org--tedious lesson plans are a breeze now! I also worked closely with a group of Research Experience for Teachers (RET) participants who participated in "real" science research for 23 days over summer and developed what they learned into a curricular unit. I am currently developing my own research on the lasting impacts of RET participation—the results thus far are very promising. I would like to share how motivated and excited these teachers were in order to encourage other teachers to look into RET programs in their areas. It is a great way for teachers to stay current on physics and learn how to bring research and modern science into their classrooms.

Contact Information

Rachelle Klinger
Physics Teaching, Purdue University
Student Teacher, Clinton Central High School
rachelle.klinger@gmail.com

Keynote Speaker

4/23/2011

Time: 11:30 am-12:30 pm

Location: H206

Interface of Radiation Physics and Medicine

Radiation Physics and medicine is a combination of two disciplines that have benefits across industries. The benefits of this interface have revolutionized the medical field. For example, an everyday application of Radiation Physics is x-ray technology, which is a type of ionizing radiation. Using ionizing radiation in the application of Imaging such as CAT scans has become an integral part of in medical diagnoses and treatments. The treatment of cancer is the most common use of radiation therapy. Our keynote speaker will highlight applications and connections between Radiation Physics and Medicine.

Mack L. Richard, MS, CHP

Radiation Safety Officer ORA/Radiation Safety.

Mark Richard is a Radiation Safety Officer with ORA/Radiation

Notes:

Notes:

Notes:

Notes:

Notes:

Time	Session A - H204	Session B - H205	Session C—H206
Talk 1 - 8:30 to 8:50 am	Building a Centripetal Acceleration Model from Uniform Circular Motion -pp 4	Designing Physics Projects for the 21st Century -pp 5	An Instrumentation Course for Teachers -pp 6
Talk 2 - 8:50 to 9:10 am	Charger Castles: Projectiles With a Twist -pp 7	MPG Equivalent Economy Labels for New Electric Vehicles -pp 8	Teaching to Teach— Adopt a Student Teacher! -pp 9
Break - 9:10 to 9:30 am	Break	Break	Break
Talk 3 - 9:30 to 9:50 am	How “springy” is a Resonance Apparatus” -pp 10	The End of Class Pass Phrase and Other Literacy Strategies for Struggling Students – pp11	Learning from Unexpected Results: Samantha’s Third Grade Levers Experiment --pp 12
Talk 4 - 9:50 to 10:10 am	Measurement and Uncertainty the GUM Way -pp 13	Detection in Muncie, Indiana, of the Fukushima Nuclear Reactor Releases Following the the Japanese Earthquake -pp 14	Physics Olympics at Noblesville High School -pp 15
Break— 10:10 to 10:30 am	Break	Break	Break
Talk 5 - 10:30 to 10:50 am	Another Use for 3D -pp 16	Advanced Lab Experiment: Pulse Nuclear Magnetic Resonance -pp 17	Don’t Buy This Book!!! -pp 18
Talk 6 -	Micro Roentgen Radiation Monitor	The Quantum Dilemma	REU and RET—Teaching and Research Come Together

10:55
to
11:15
am

-pp 19

-pp 20

-pp21