# FALL DEMO NIGHT 2009 AT LEADERSHIP ACADEMY

The 2009 Fall Demo Night was held on Friday, October 30th at the Science Leadership Academy at 22nd and Arch Streets in Philadelphia. Many thanks to our hostess, Rosalind Echols!

These are the demos that were presented:

- **Barry Feierman; Westtown High School**

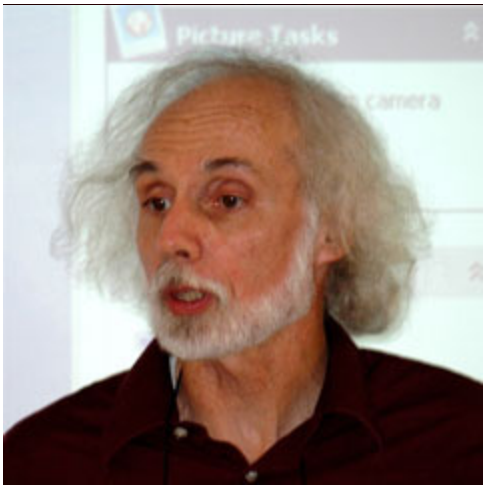
A collaborative teaching request started Barry thinking about combining music and physics, and so he developed a senior elective course. The course is team taught. The Fall term will cover the basic physics, the winter term will cover the music theory and the spring term will be spent with each student designing and building an instrument. At the end they will write a score for all the instruments.

The question: How do musical instruments make sound? For example, a piano tuner came in and demonstrated to the class how the piano produces sound.

LabPro converts sound to an electrical signal and displays it on a computer showing the sound spectrum.

Free software is available: by E. R. Huggins (Dartmouth) called MacScope. This records and plays specific harmonics using the sound card in the computer. See www.physics2000.com

- **Bill Berner, University of Pennsylvania**




Bowling balls are a great example of inertia. Teach concept first.

What is the difference between mass and weight? Students play with the bowling balls and find that they have a mind of their own. The force tries to move the ball at infinite speed. The mass resists the force. Most every day objects have low inertia. The bowling ball is different. Students use a broom to deliver the force to keep the bowling ball on a circular path, pushing all the time with tiny forces. You can only push directly away from yourself for this exercise.

This activity has been done with grade school kids, college kids and veterans. They were all equally enthusiastic about it!

After they get the bowling balls to follow the desired path, they try the same thing with a playground ball.

Bowling balls are easy to get for free- bowling alleys give them away. Most balls are 14-16 lb but some are 6 lb. They all look the same.

Which ball is best for which situation? A) constant velocity B) constant acceleration c) drag race

On the race track, cars always accelerate (second law).

- **Ellen Kruger, Springside School**

  Microwaves- what do they do?

  For her 9th grade physics class Ellen put things in the microwave you're not supposed to put and observe what happens. This gets students to think about what the microwaves are and how they interact with different substances.

  The following were demonstrated:


Marshmallows- to measure the speed of light. Use mini-marshmallows for this, spread in an even layer in a pan in the bottom of the oven. Put the microwave on for 20 seconds on HIGH The marshmallows show the locations of the nodes and anti-node s. The anti-node to anti-node distance for a 2400 MHz oven is about 6 inches. (The frequency is listed on the back of the oven.)

Ice doesn't melt: Solid ice, that is, doesn't melt. Only water reacts with the microwaves.

Soap explodes: Air pockets in the soap expand. The soap stays cool. Ivory soap was used here.

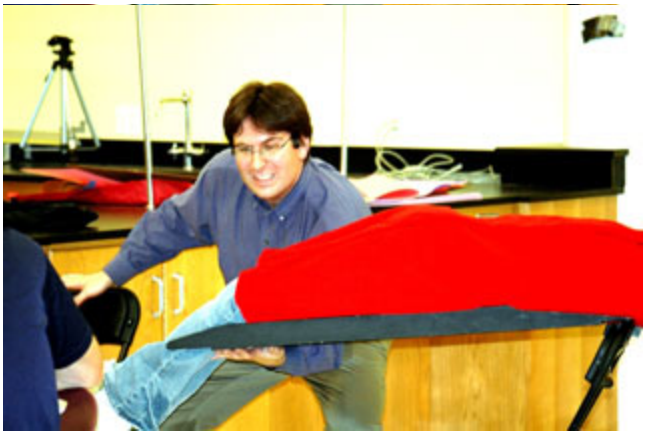
A CD- forms fractal patterns on its surface as it expands and contracts.

- **Ken Fink, Wondergy (also teaching part-time at West Chester University this semester)**

  The Physics of Skateboarding:

The skateboard rotates about one wheel when maneuvers are done with it. The trick of skateboarding is to learn how to balance the board.

Using the same principles, Ken demonstrated how it is possible to balance a person on a board supported on two chairs. He had a student lie on a board placed across two chairs so that the student's center of gravity was directly above the support point of one chair. He removed the board- and the student magically stayed supported (it helped that he used the magician's set of two boards).



- **Fran Poodry, West Chester East HS**

  Student awards:


Fran proposed that we use our membership dues to support excellent physics students. Awards are given through the Delaware Valley Science Council Student take an exam to get the award. A new award was proposed for the Science Olympiad. Also, an International bridge building contest will be held at Radnor HS. Dues could be increased by a few dollars, perhaps to $12 a year to support more sponsorship awards.

National AAPT offers reduced dues for HS teachers.

- **Jay Bagley, Philadelphia Military Academy**

Calbot is a calculator controlled robot. This is supported by Texas Instruments and NASA.

TI provides the TI-83 calculator and programming. The calculator is mounted on a cart. Students have to figure out how to make it work. The robot cart has a CPU, so they program it. They can add balloons and thumbtacks to make it interesting.

Tyson Tuchscherer has written a manula "Calculator Controlled Robots" as part of a Hands-on Math and Science Discovery program.

Jay will be running workshops soon. Sign up by emailing him at ebagley@phila.k12.pa.us

- **Marc Baron, Sun Valley HS**


Balanced Forces vs. Unbalanced forces:

In SI units, the mass is in kg and the weight in Nt. In English units, the mass is in slugs, the weight in pounds. Nobody knows what the English system unit of mass is.

Look at the famous trick- balance raw eggs on a pizza pan which is supported on a beaker of water. If you hit the pizza pan along its edge with a broom, the eggs should drop into the beaker of water.

This was done on the Johnny Carson show by Dom de Louise - and it worked. Not one egg broke in the trick- they all dropped into the beaker. However- Marc said, when he tried it in front of a class it was a disaster. The video of the Johnny Carson show is available on YouTube.

EasyYouTube downloader allows you to download the video from YouTube and save it.

- **Mary Anne Klassen, Swarthmore College**

The Wilbur Force Pendulum:

MaryAnne demonstrated a version of this pendulum made from a slinky and a soup can. Both ends of the slinky have to be clamped. The top of the slinky is clamped to the top of the soup can (separated from the can), the bottom end of the slinky is attached to the can, Four bolts are screwed into the sides of the can. The pendulum is a torsion pendulum as well as an oscillating spring.

- **Mary Sevon, Conwell-Egan Catholic High School, Fairless Hills, PA**

  Notebook Circuits:

The circuit is made from strips of adhesive backed copper tape used for stained glass work (found at an arts and crafts store)instead of wire. The tape is attached to a piece of heavy duty cardstock paper.

The components are Xmas tree lights- cut from a string of lights, instead of light bulbs along with two AA batteries. Electrical contact is made by touching the leads of the Xmas lights to the copper strips.All of the circuits can be checked with meters. You can connect the lights in series and parallel. When they are done with the experiment, the students can take the whole circuit home and play with it some more.

This experiment is part of the CIPT summer course for high school physics teachers at Cornell University.

- **Bill Heffner, International Materials Institute fo Glass at Lehigh University**

Optical Fiber Drawing Tower:

This is a hands-on experiment in glass science- built around glass the student can make at home. Specifically, hard candy provides a good way to model the behavior of glass and manufacture the equivalent of optical fibers. Students build their own experiment and apparatus.

See the website http://www.lehigh.edu/imi/libraryglassedu.html for a video lecture and demo, the recipe and procedure and building instructions. The sugar mixture is heated to the temperature required for forming the "sugar-glass". The mixture is formed into a rod which is drawn into a thin fiber. The physical and chemical properties are studied as well as engineering applications. >/td>

Bill is very interested in how this process can be applied to the high school classroom and would like to have feedback from teachers.