ISPP REMINDER

November 2009

Our next meeting…

…is at DePaul University
Tuesday, December 1, 6:30-9:00 PM

A Map and Directions are Attached

At our last meeting…

…we were greeted by the entire **New Trier** physics faculty anxious to do demonstrations. **Nick Drozdoff** began with a double-barreled potato cannon made of PVC pipe. It was about 2m long with an ignition chamber in the center. He asked which way the cannon would move. He fired the cannon into a bucket on each side and the buckets flew off the table but the cannon itself did not move. Nick also brought a book he liked called *The World is Flat: A Brief History of the Twenty-first Century* by Thomas L. Friedman.

John Miller brought a video he shot of a cart that enters from the right, slows to a stop just past the center, and exits accelerating to the right. He asked us to propose a force that could account for this motion. Then he showed the video shot from a distance so we could see the cart was going up a ramp and the camera had been tilted. (Does that remind anyone but me of Hume and Ivey?) John said it helped his students do horizontal and vertical components because they had to discuss the directions the force actually pointed when the cart was on the ramp.

Sheri Donovan brought up the topic of the "ghost flute." She had a couple plastic recorders and played notes on them that differed by some number over 100Hz. This makes the beat frequency audible and since the recorders play such a pure tone (with few overtones) many of us could hear the beat frequency.

Ryan Dunn has an Excel spreadsheet that he uses to add vectors. He lists 25 vectors with magnitude and direction given by compass direction, degrees, compass direction such as 8N30^{o}E. He has each student choose two vectors and the computer adds them using arrows and components. The student with the vector sum with the largest magnitude "wins." Then he has them choose 3 vectors and add again. Ryan says this is a fun competitive activity that requires students to add vectors in their heads.

Sharon Waring has wired lights and switches into some doll houses to help the students learn about simple circuits.

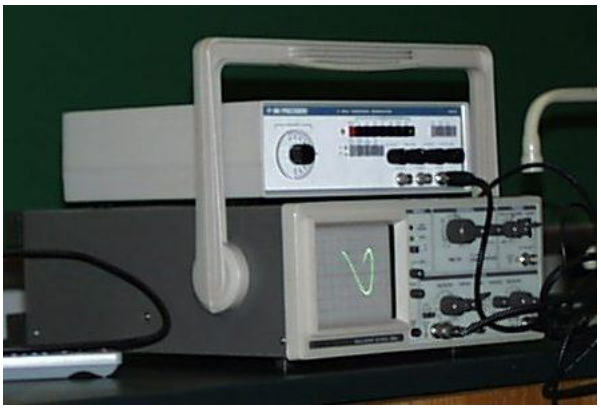
That was five nice demonstrations before the meeting started. Thanks New Trier!

Scott Welty (Columbia College) brought his daughter, Leah Welty-Rieger, who had taken some pictures along the lake shore. In one of the pictures, 6 seconds at f/3.5 the lights looked like circles or balls. In the other 30 seconds at f/11 they looked like stars. The star effect occurs where the blades of the aperture overlap forming a hexagon. So we get 6-pointed stars if the aperture is small enough for diffraction to be an effect.

John Milton (DePaul University) brought a PASCO ball shooter that has a compressed spring. He shot the ball straight up and it went about 1 meter. Then he asked how high the ball would go if he doubled the spring compression. He said that with his class they look at the F vs x graph before they decide. Then he tried it and the ball hit the ceiling 2 or 3 meters above with considerable force. We decided it would have gone 4m except for the ceiling.

Tom Senior (Lake Forest College) brought more of his spinners. They are made from PVC pipe that is cut on integer multiples of their circumference. An x is placed on one end and it is spun by pressing it with one finger and snapping it out. As it spins it rotates on one end so that every time the pipe spins on its short axis it spins that integer number of times on its circumference. (I hope that's clear; it's easier if you see it). The result is that you see as many "x"s in a circle as the integer. These are easy to make from ½ or ¾ inch PVC pipe. Tom gave away another bag of them for us to play with. Tom also passed out a nice info sheet and you can watch it on YouTube at http://www.youtube.com/watch?v=F8-PrVJ5Q-Y

Pete Insley (Columbia College) brought a scope to show Lissajous figures because **Joe Serpico** from Niles West High School said he'd never seen them. I used an adapter (a 9V AC transformer) for a signal to the "x" axis and a function generator set a 120Hz as a signal to the "y" axis. The Lissajous figure seemed to rotate because I was slightly off the 120Hz. I challenged everyone to see if they could use their "brainwaves" to reverse the direction the figure was turning. I use the figure in math to introduce the idea of 3 dimensions and perspective.



Martha Lietz (Niles West High School) has her students taking data and then graphing it. She has them figure out the function and then graph that to get a straight line. When she uses My Solar System 2.0 she has the students change the radius of the orbit and then find the velocity that produces a circular orbit. The equations are $\frac{GMm}{R^2} = \frac{mv^2}{R}$ so v^2 vs $\frac{1}{R}$ produces a straight line. Not so easy. *My Solar System 2.0* can be found at http://phet.colorado.edu or try Google. You can create any number of planets and suns and watch them spin around each other. Great fun!

John Lewis (Glenbrook South High School) put a piece of masking tape on a 45 rpm turntable. He videotaped it turning and then imported the film to Logger Pro. He says it's easy. Then he used Logger Pro to analyze the motion. The program gives "x" and "y" position, velocity, and acceleration. The acceleration turns out to be $2 m/s^2$ at 9cm radius and 45 rpm.

Scott Welty (Columbia College) returned to mention his book *The Why Book of Sailing: The Curious Sailor's Guide to the Science of Sailing and Seamanship.*

The meeting ended with **John Miller** opening a couple boxes of toys for giveaways. We went home well satisfied.

Reported by Pete Insley

COME TO DE PAUL! BRING FRIENDS!

Future Meetings (Some dates to be determined)

Elmhurst, Wednesday January 13
NEIU, Thursday, February 4
Loyola, Wednesday, March 3 or 10
Lake Forest College, Tuesday, April 6 or 13
Northwestern, Monday, May 3
MSI, Tuesday June 1 or 8

To get to DePaul University:

From the north and northwest . From the Kennedy Expressway (I-90/I-94) exit at Fullerton Avenue and turn left (east.) The Lincoln Park campus is approximately two miles from the expressway on Fullerton Avenue at Kenmore Avenue.

From the west. From the Eisenhower Expressway (I-290), turn onto the Kennedy Expressway (I-90/I-94) heading toward Wisconsin. From the Kennedy Expressway (I-90/I-94) exit at Fullerton Avenue and turn right (east). The Lincoln Park campus is approximately two miles from the expressway on Fullerton Avenue at Kenmore Avenue.

From the south. From the Dan Ryan Expressway (I-90/I-94) continue as the expressway becomes the Kennedy Expressway (I-90/I-94). Exit at Fullerton Avenue and turn right (east.) The Lincoln Park campus is approximately two miles from the expressway on Fullerton Avenue at Kenmore Avenue.

From Lake Shore Drive (north or south). Exit Lake Shore Drive at Fullerton Avenue. Head west for approximately three miles. The Lincoln Park campus is located at Fullerton Avenue at Kenmore Avenue.

Parking

The lot just north of Byrne hall is not available for parking. Evening on-street parking in much of the area is restricted. If you cannot find on-street parking, use the high-rise building indicated on the map. We will give you forms at the meeting to avoid parking fees.