

ISPP REMINDER

October 2013

OUR NEXT MEETING ...

...is at
Illinois Institute of Technology
Tuesday October 22 2013
6:30 – 9 pm

Scroll down for a calendar and map.

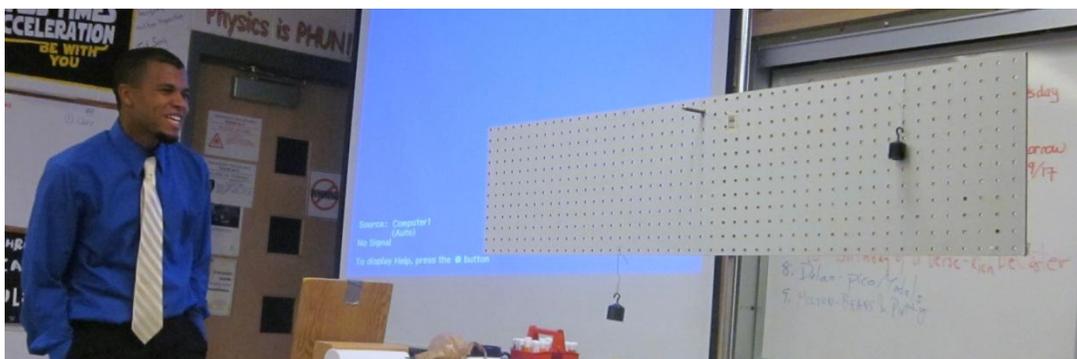
AT OUR LAST MEETING...

... at Niles West High School, Martha Lietz welcomed us and began by passing out student worksheets for a phenomenon, a “Jumpin Bug” pop-up toy. The students measure the time it takes for the toy to go up and back down – the average of several trials. They then have the time of ascent. And answer a set of questions about the motion (e.g., velocity at $\frac{1}{4}$ total time, final velocity before landing), and draw a velocity-time graph of the motion. She told us her school had acquired some high-speed cameras (1000 frames/sec, \$300). Two halogen lamps provide illumination. She can do a frame by frame analysis of the motion. The poppers are available at Constructive Playthings, Main and Lincoln, in Skokie.



Announcements: 1. We were reminded of the next meeting, at IIT on October 22. 2. Debbie Lojkuts suffered a staph infection that affected the port for her chemo treatment. There were cards available for us to sign to send to Debbie.

John Metzler (Niles West H S) slid a pegboard onto a horizontal rod and placed two unequal mass objects (100 g and 200 g) at appropriate distances from the fulcrum to obtain equilibrium. He pointed out that students had done this sort of exercise using a meter stick. He asks: What will happen if the 200 g object is located lower than before, but at the same horizontal distance from the fulcrum? When students are polled, they almost always say, for a variety of reasons, that the board will rotate, though they do not agree on the direction of rotation. John then lowered the object and we saw that equilibrium was maintained. Martha sees that as a good place to emphasize the “moment arm” concept. Paul Dolan suggested moving the fulcrum off center. He told us that a 2-meter stick with the fulcrum very close to one end can be balanced by a paper clip at the other end. John Milton told us that had students push down on the meter stick at various locations, so they could “feel” the reduction in force as the lever arm increased.



Art Schmidt (Northwestern U) moved to a smaller office and went through some old material. He found a brochure from years past on The Sciences at Lake Forest College. It included pictures of ISSP founders Harald Jensen and Earl Zwicker.



Art brought a copy of Make Magazine and showed us an article with detailed instructions on how to make a Tantalus Cup. If it is filled beyond a certain limit a siphon action begins and the cup drains. He pointed out that the Make Magazine explanation is incorrect. He also showed part of a video that shows a siphon that uses a high cohesive fluid and produces a “siphon in a vacuum.”

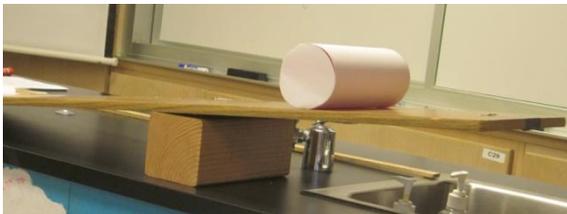
<http://www.youtube.com/watch?v=8F4i9M3y0ew> Then Art passed around a Tantalus Cup and some other objects he had made using a 3-D printer. He showed us how the 3-D object is built up from 2-D layers. Even Legos can be made this way. One can take a series of digital pictures, circling around an object, at several levels, and submit them to an online site that will create that layered drawings tghan the printer can use to create the object.3-D printers are now available in some public libraries.

Next Art showed us a small version of the vortex tubes made from large plastic garbage cans. He takes the neck off a balloon and stretches the balloon over a plastic drink cup.

Kathy Fritsch (Waukegan H S) spoke about her use of ACT test materials as a teaching tool. She uses past ACT test questions a starters for some of her classes. She has seen improvement in her students’ ACT scores and sees this a way of meeting science reading standards. She tries to use questions that match the level of the course. Martha Lietz referred to the use of past AP questions in a similar way.

Elizabeth Ramseyer (Niles West H S) told us that she and colleague **Rich De Coster** have been teaching astronomy classes since 1987. In the early 2000s they connected with Yerkes Observatory and have been conducting star parties for the local community. Through the Yerkes connection an observatory was donated to Niles West. See <https://sites.google.com/a/d219.org/nwhs-observatory/>

Pete Insley put a cylinder on an inclined plane and we saw it roll a little bit, then stop, then roll... Pete asked: What is it, what’s in it. He took off the paper cover and we saw plastic cylinder. Inside the cylinder, Pete told us, was a rheoscopic fluid. He asked whether the motion down the plane was accelerated or not. It didn’t look accelerated at first, but it seemed to speed up partway down. The source is Educational Innovations, about \$15. See <http://www.teachersource.com/product/rheoscopic-fluid/energy-motion> and look at the npdf document – background and lab ideas. Pete said he will discuss the acceleration question at the next meeting.



Rich De Coster (Niles West H S) passed out “Compare Light Curves” sheet, with two graphs of star brightness (magnitude) vs. time in days. The shapes were the same but the scales were different. Before discussing this, he showed a Power Point, “90th Birthday of Uinverse, October 5, 1923-2013”. The next frame referred to the site <http://nova.astrometry.net/> Rich said that if you send telescope pictures to this site you will receive information about the areas in the pictures. He showed us a couple of examples.

Rich went back to his starting point – what happened 90 years ago, on October 5?. He suggested a boob, the Day We Found the Universe, by Marcia Bartusiak. (He obtained a used copy for \$4 on The book will be discussed at Yerkes next tear on February 1. Rich got a copy from Googlr for less than \$4. Thew graphs he gave use are of brightness vs. time for two cepheid variable stars with about the same period (bright-dim-bright). Since they have the same period, they have the same luminosity, but the star in Andromeda is 100 times fainter than the start in the Small Megellanic Cloud (SMC). This means (inverse square law) that the star in Andromeda is 10 times as far from us as the star in SMC. Hubble made this discovery in 1923, confirming that the galaxies are separated by great distances. A good source for students is Skynet.

Paul Dolan (NEIU) has come up with analogies that may be useful for helping middle school teachers present concepts on the atomic and subatomic scales, using blocks and magnets. Three ring magnets on a vertical peg with like polarities (north-north and south-south) can represent two protons and a neutron. A pile of blocks on a slightly inclined plane become unstable as the pile gets bigger. A second pile in contact with the first pile adds a little stability. Paul suggested a football analogy for subatomic particles. A quarterback is a nucleus and the football is the emitted particle. The Higgs boson could be a ball in the hands of a running back, who is less likely than the quarterback to release the particle. Paul suggested that the analogy could be extended to collisions of particles.

John Milton told us that after had had surgery for carpal tunnel syndrome he was given therapy that includes daily flexing a quantity of putty. He did this for a moment, then put the putty back in its container. John brought a simple exercise he got from the physics teacher at Cristo Rey St. Martin in Waukegan, used early on to illustrate scientific reasoning. Each group is given an empty plastic bag, one containing 100 beans, and one containing an unknown number. The group is to determine the number of beans in the “unknown” bag without opening the bags. Observation of the groups at work is interesting; some come to find the mass of a single beaqn pretty quickly, others take a little longer. John also spoke of the usefulness of some of the low-tech ideas from the old PSSC course, specifically the use of a ticker tape timer to analyze and measure motion before using tools such as motion detectors and photogates. When he went back to the putty, we saw that it had conformed to the shape of the container – so, we concluded, it is a kind of liquid.

The meeting ended with the opportunity to pick up our giveaways – popper hoppers. Thanks to the physics folks from Niles West for an enjoyable and instructive evening.

Reported by John Milton

Future Meetings

November - CSAAPT	Oakton Community College	Saturday 11/16
December	DePaul	Tuesday 12/3
January	Elmhurst	Wednesday 1/15
February	NEIU	Thursday 2/20
March	Lane Tech	?????
April	Lake Forest College	Wednesday 4/9
May	Northwestern	Monday 5/5
June	MSI	Tuesday 6/3

