**ISPP REMINDER** **June 2011**

**<u>OUR NEXT MEETING</u>**…

…is at **the Museum of Science and Industry**
**Tuesday**
**June 7, 2011**
**6:30 – 9:30 p.m.**

Scroll down for a map and directions.

**<u>AT OUR LAST MEETING</u>…**

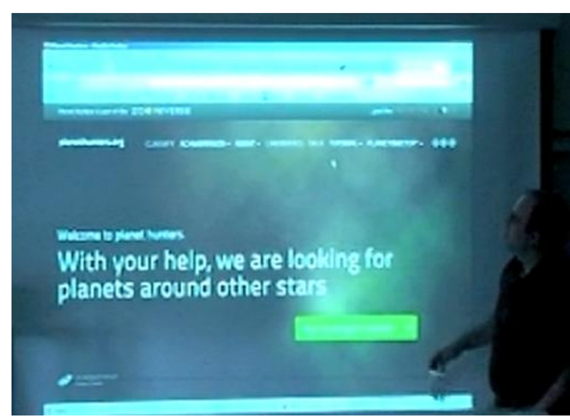
**Martha Leitz** welcomed us to Niles West High School.

We began with several announcements for things happening this Summer and next Fall.

1. July 11-15 Martha Leitz and Gordon Ramsey will repeat their popular (and successful) AP Physics workshop. http://www.luc.edu/apinstitute/physics.shtml

2. October 27-29 Illinois Science Education Conference in Tinley Park, IL. Joint meeting for ISTA, CSAAPT, ISAAPT, and IACT (Chemistry Teachers). Paper deadline June 15. For more info: http://helios.augustana.edu/isaapt/f11/isaapt.html

3. Get free (or reduced price) *Mathematica* for your school from Wolfram. Email Brenda Marshal at brendam@wolfram.com




Next followed a series of internet astronomy displays from **Andy Morrison** (DePaul University), **Rich DeCoster** (Niles West High School), and **Elizabeth Ramseyer** (Niles West High School). It seems that the Hubble and other space telescopes (and some ground-based ones) have been taking data and storing it faster than astronomers can analyze it. So they have organized the data so that anyone can look at it and perhaps pick out something that should be followed up on. This gives students a chance to be part of research. Examples:

1. www.planethunters.org gives you a brightness vs. time record of 150,000 stars. You pick one and look at the light curves and decide if you are seeing a planet transit. If so you can flag it and add your comments to others who have also flagged it.

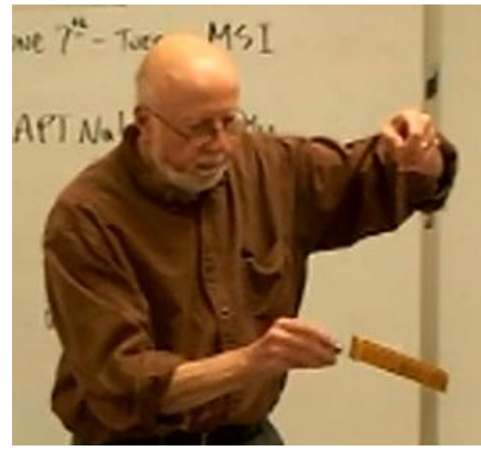
2. www.astrometry.net lets you send in a picture of the sky that you took and the program tells you where you were looking.

3. This Flickr link: http://www.flickr.com/groups/astronomy will show you stars brighter than a given magnitude in any area of the sky.

4. **Elizabeth Ramseyer's** Astronomy Outreach website: https://sites.google.com/a/d219.org/imaging-the-skies/ has her work with her classes and lots more links. Elizabeth also passed out *"Uncle Al's"* skywheels to help us identify anything we can see in Chicago skies. They are from the University of California.

These sites are appropriate for all levels of students from middle school to graduate.

**Art Schmidt** (Northwestern University) brought a square inch of graphite that he said was diamagnetic (repelled by magnets), and a strong magnet. He laid the graphite on the magnet and nothing happened. He suggested a smaller piece would be lighter so we took various sized pieces from his square and tried them on various magnets. I got a piece smaller than one millimeter to stand on edge rather than flat on one of those three-eighth inch diameter neodymium disc magnets. Art attached what was left of his square to the end of a wooden ruler and hung it from a string to create a torsion pendulum. His magnet then repelled the graphite. You can get your own square from *Educational Innovations* for $15. Art also showed us another of their products, that demonstrates diamagnetic levitation, a gold-plated NdFeB magnet that hovers between two graphite blocks ($74.95). You can see them both at http://www.teachersource.com/SearchResults.aspx?sterm=diamagnetism



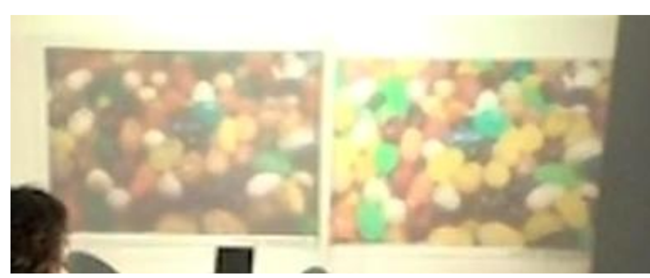
**Paul Dolan** (Northeastern Illinois University) returned with his Robostir devices. He has taken them apart and found a motor inside with an offset weight (just as you would think). The rotation of the motor causes the case to vibrate and the legs to make the whole device rotate. If you want one Google "Robostir." They are about $10. Avoid the box that says "buy more."

**Roy Coleman** (retired, Morgan Park High School) brought a few things "from his basement" – lots of various graph paper, a tank periscope, and a lab the students are supposed to do in their heads. He thought we could attach the lab to these notes. I have no idea if that's possible, so I'm leaving it up to John.

**John Milton** (DePaul University, retired) announced that *Arbor Scientific* has a complete basic ripple tank for the overhead for $49. There are lab sheets for the teacher. He also mentioned that *Vernier* has a complete high school lab program available for $200.

**Ann Brandon** (retired, Joliet West High School) brought back the ray diagrams questions for mirrors at angles. A good question is what angle(s) of the mirrors will produce a reflected ray that is parallel to the incident ray?

Finally **Martha** passed out the giveaway… some 3-color transparencies that can be overlaid to show how full color can be produced. (Original is one the right.) She also mentioned *Khan Academy* (http://www.khanacademy.org/) which is a website with lots of YouTube tutorials on math and science subjects. We just got a short glimpse but they were impressive; just the thing for a student who missed class or has a slightly off-topic question. Check it out yourself.



Thanks for another great meeting, and be sure to join us for the next. (Roy's Gedanken experiment is on the next page.)

Submitted by Pete Insley.

For any information regarding ISPP see the home page http://www.ispp.info/

**<u>Correction</u>** **Art Schmidt's** presentation on liquid crystals was incorrectly described in the May Reminder. The corrected description is now available at http://www.ispp.info/

Experiment III

# **das Gedanken experiment**

K. Kerfin
R. Coleman
F. L. Slick

Today's lab work will be a little different from the usual. Instead of actually performing an experiment, we will just think about what would happen if we actually did it. Not only does this save us a lot of time and expense for the equipment; it also enables us to get rid of many annoying factors (such as friction, for example) that would otherwise throw a small monkey wrench into the works.

Think about an object in space. When we begin thinking, the object is one meter to the right of a point. Two seconds later, it is three meters to the left of this same point, and at the end of the experiment (seven seconds after the beginning) it is 13 meters to the left of this same point. Just to confuse the issue further, think about a second object which begins the experiment eight meters to the left of our original point. After three seconds this second object is one meter to the right of that point and at the end of the experiment it is 13 meters to the right of the original point.

Without drawing pictures or graphs of any kind, try answering a few simple questions about this situation. Where would each object be at the end of four seconds? How far would each be from the other at the end of six seconds? When did they pass each other? What was the speed of each object? If you cannot answer these questions, say so and proceed to the next paragraph and follow those directions.

Frequently, you will find that drawing a picture helps immensely in solving a problem. One kind of picture that can be particularly useful is the graph. The most important objective of this experiment is the demonstration of this technique's usefulness.

After you have kicked the above questions around for a while, reach for a sheet of graph paper. Label the vertical axis "distance" and the horizontal axis "time" (in your write-up, explain why you should label them this way). You should now be able to represent the position of each object in terms of a □pair□ of measurements for each bit of information given you. How can you represent the words "left" and "right" in terms of numbers? When you have figured these things out, make a data table and then draw one graph from all of the information given you. This graph should fairly scream at you to calculate the coordinates of a point on the graph; do so, but be careful to be algebraically rigorous! What are the coordinates and what do they mean? Can you now answer all the questions in the third paragraph of this experiment? Don't just □sit□ there; answer them!

In your discussion, tell what assumptions you had to make and also how safe you think they are. If you can think of limitations on this technique, point them out. Include possible errors in measurements in your discussion of these limitations. (For those of you who take a foreign language explain the title.)

## Directions to MSI

**From the north.** Head south on Lake Shore Drive and turn right onto 57th Street. Get in the left lane and follow 57th Street around to the Museum's west side. Turn left to enter the Museum's underground garage.

**From the south.**

**Via I-94:** Take I-94 West to the Garfield Boulevard exit (exit 57). From the exit ramp, turn right and continue east on Garfield/55th for approximately one mile into the entrance of Washington Park. Bear right onto Morgan Drive for a half-mile, and bear right again onto Payne Drive for about a third of a mile, then turn left on Midway Plaisance. Continue east on Midway Plaisance for about a mile until it ends at Cornell Avenue, then turn left. You will see the Museum ahead on your right. Turn right at the 57th Street stoplight to enter our underground parking garage.

**Via the Indiana Toll Road and Chicago Skyway:** Exit the I-90 Chicago Skyway at Stony Island Avenue. Continue north on Stony Island for about a mile. As you approach E. 68th Street, move to the right two lanes so that you can bear right to follow Cornell Drive. Take Cornell Drive north about one mile, and turn right at the 57th Street stoplight to enter the parking garage.

**From the west.** Follow 290 East or 55 North to Lake Shore Drive. Go south on Lake Shore Drive. Exit right on 57th Drive. You'll need to be in the left-hand lane as you follow the curve around to the west side of the building and Cornell Drive. Turn left to enter the Museum's underground garage.


**Park in the garage.** Gates to be up when you leave, as last year.

Go up one flight of escalators and follow the signs to the Columbian Room.
Note: the Columbian Room is not in exactly the same location as last year. Instead of going up the steps in the Green stairwell, follow the corridor to the right.