

Our next meeting...

...is at New Trier High School Northfield Campus  
Thursday, October 15, 6:30-8:30 P.M.

A Map and Directions are Attached

At our last meeting...

...at Niles West High School, **Martha Lietz** greeted us and introduced her physics teacher colleagues: **Rich de Coster, Joe Sarpico, Howard Swider, John Metzler and Elizabeth Ramseyer.**

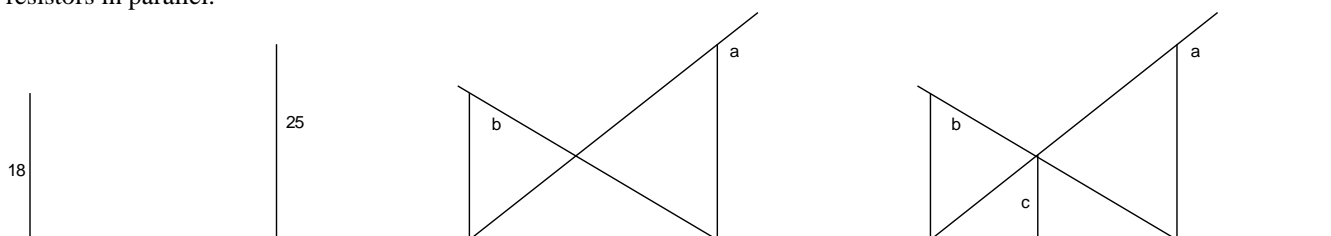
**Tom Senior** (Lake Forest College) set up a wave pendulum we had seen before, along with an instruction sheet for building it with background on the physics involved. There is a total of eight pendulums on bifilar suspensions. Tom gives a formula for determining the lengths of the pendulums as a function of the greatest length. Once the set begins to swing the pendulums go out of phase and return to be in phase every sixteen swings. We could see this clearly since Tom had mounted the apparatus on the stage of an overhead projector. A neat start to a good meeting!

Martha told us we were getting the giveaway at the beginning of the meeting because it would be used in some of the early presentations. We received a plastic bag with six color filters (primary red, green, yellow, and complementary cyan, magenta and yellow) and a piece of holographic diffraction grating. We also received handouts on the sources and costs of the color filters and the grating material.

**Gerry Lietz** (De Paul, retired) identified the Reminder authors: Art Schmidt, Pete Insley, John Milton, Martha Lietz, and himself, and made an appeal for others to step up and try their hand at authoring. **Paul Dolan** (Northeastern Illinois University) passed out some scholarship information. Three new teacher bags were given, to **Karlene Joseph** (Lane Tech) and **Cathie Anderson** and **Fatima Hilario**, two of Paul Dolan's students.

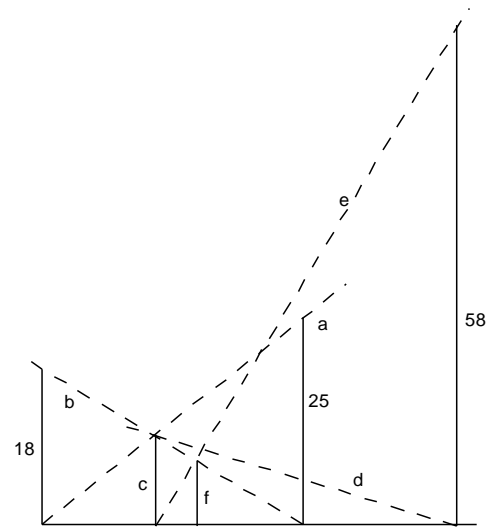
**Pete Insley** (Columbia College) Showed us a geometry construction that relates to resistors in parallel. He asked for resistance values and we came up with 18, 25 and 58 ohms. Then he drew a horizontal line and from it drew two vertical lines 18 and 25 cm long.

Next he drew two lines (a and b in the drawing) from the horizontal axis to the tops of the vertical lines and measured the height of the line drawn to the intersection (c in the drawing). The length of this line is about 10.5, the value of the two resistors in parallel.



Pete did the same for the 58 ohm resistor, combining it with the equivalent of 18 and 25 (dashed lines d and e) to get an equivalent (f) of length 8.9. the equivalent of the three resistors in parallel. It was pointed out that this method applies also to capacitors, lenses and springs in series. The derivation is not too difficult (I was able to do it!). Neat.

We were then treated to a series of presentations using the color filters and the grating. Martha Lietz began by letting us look at combinations of filters on the overhead, asking us at times to predict what we would see. Then she put the holographic grating sheet over the lens of the overhead, with a slit on the stage, so we could see the spectrum on either side. We were asked to look at the spectra through various filters. These activities prompted some lively discussion and exchange of ideas.



**Elizabeth Ramseyer** from Niles West then showed us two color enhanced pictures of the crab nebula related to multiwavelength astronomy and are used in the Active Astronomy program sponsored by NASA. We saw how some features stood out when the pictures were viewed through some of the color gels.

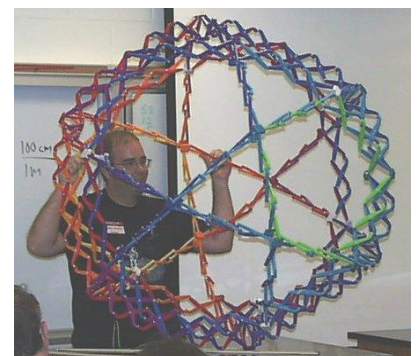
**Joe Serpico** began a power point presentation with a cartoon that asked questions about the effects of color mixing. Joe said the “color detective” asks students to think about what happens when colors are mixed and about the difference between seeing “pure” colors and colors that result from mixing. We looked, for example, at yellow through green and red filters and then put red over one eye and green over the other – as a result of eye fatigue some interesting things happened. We stared at red on the screen and then when it was turned off we saw green, etc. Anyone interested in his slides can e-mail him at [joeser@niles-hs.k12.il.us](mailto:joeser@niles-hs.k12.il.us).

**Rich De Coster** reminded us that Jupiter is visible in the eastern region of Capricornus. He showed us some views of Jupiter taken mostly in his back yard observatory in August and September. We saw some zoom pictures of Jupiter’s moons at about a 3.5 degree field of view, and also saw stars from Capricorn and aquarius. Rich pointed out that we are observing the 400<sup>th</sup> anniversary of Galileo’s observation of Jupiter’s moons and that now they can be seen with binoculars. He uses simulations to show students what they can see on a particular evening. The September 13 picture showed Jupiter in retrograde motion – some discussion of retrograde motion ensued.

Rich then set up a lamp with a pentagon-shaped filament. He used a lens to form an image of the filament. Then he used an identical lens that was covered by a card that had three pencil-sized holes in it, with each hole covered by a different filter. The three color filament images superposed when they were in focus and the color images helped us to see how the images reversed location when the viewing screen location was moved from in front of the focal point to behind it.

Our thanks to the Niles West teachers who “enlightened” us with their astronomy and color materials.

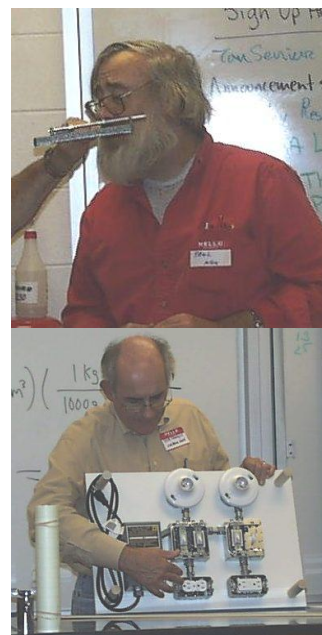
**Andrew Morrison** (De Paul University) told us some of his students in the algebra-based introductory course had difficulty with unit conversion. He asked them how many cubic centimeters there are in a cubic meter and got a variety of answers, mostly too small. He reminded them that unit conversion involves multiplication by 1 and used meter ticks to give them a sense of the size of a cubic meter. He also expanded a Hoberman sphere (we have seen these before) to about a 1 m<sup>3</sup> volume (diameter of about 1.2 m) to give them a sense of this volume. (Hoberman spheres can still be found on the web – go to Google.)



**Paul Dolan** (NEIU) brought a page from PIRA200, taken from the PIRA website. (PIRA = Physics Instructional Resource Association.) He suggested that we might include the PIRA classification number for our demos when we present at ISPP.

<http://physicslearning.colorado.edu/PiraHome/pira200/pira200.htm>

Paul referred to the Simultaneous Fall apparatus described on the PIRA excerpt: a spring loaded device drops one ball and projects the other horizontally. He brought one that he had used for some time and it turned out to have a broken piece that he able to repair after using one supplied by Niles West. We saw (and heard) that the two balls hit the floor at the same time. It was pointed out that a demo like this is of great help to students who find trajectory motion difficult.



**Bob Froelich** (Glenbrook North High School) showed us a circuit board that illustrates residential wiring. He gives it to his students as a motivator near the end of the school year. They work in groups. Bob aid it's inquiry based – the question is how should this be wired? They are given worksheets and test out the continuity of the circuit with an ohmmeter. Worksheets can be found on his website:

<http://www.glenbrook225.org/north/departments/science/teachersite/Pages/RobertFroehlich.aspx>

**Eileen Wild** showed us several transparencies she had made, mostly from the Chicago trune weather page. They described several weather and atmospheric related phenomena, such as reflection refraction related to the highway mirage, the Coriolis effect and storms, lightning from a great distance on a sunny day, and the seasons.

**Kevin McCarron** (Oak Park and River Forest High School) had us look through a NASA spectroscope using color filters. The plans are at

[http://www.nasa.gov/audience/foreducators/topnav/materials/li\\_sbytype/Constructing\\_a\\_Spectroscope.html](http://www.nasa.gov/audience/foreducators/topnav/materials/li_sbytype/Constructing_a_Spectroscope.html)

He also gave us the link to his HOU Color Astronomy material:  
<http://faculty.oprfhs.org/kmccarron/hou/color/>



(Sorry, Kevin, I missed the reference to Mr. M.)

**John Milton** (De Paul University), brought an assembled Galileoscope, an International Year of Astronomy cornerstone project. He ordered it after the summer AAPT meeting for \$13 plus shipping. It has been very popular and the prices have gone up to \$20 each plus shipping for 1 to 99 units, or \$15 each plus shipping for 100 units or more. It comes in kit form and is designed to be an educational tool, starting at the lower grades. John said the assembly instructions that come with the telescope might be difficult for a junior high teacher without much optics background. But there are several web sites with detailed instructions, such as <https://www.galileoscope.org/gs/content/update> Just Google Galileoscope. Adler Planetarium has a nice video on YouTube <http://www.youtube.com/watch?v=A1iByPaAG0U>

**Gordon Ramsey** (Loyola University) set up a problem we had seen at an earlier meeting, that of the velocity of a cylindrical spool of paper unwinding as it rolls down an incline as a function of distance. He assumes a uniform density He set this up for us and stepped us through the neat logic of his analysis, including practical limitations like the conversion of the original potential energy into internal energy. As the photo indicates, he used both a rollof chart paper (at the bottom of the incline) and roll of ordinary toilet paper.



**Dan Cahill** (Grayslake Central High School) had presented a paper at an AAPT Chcgao Section meeting on an experiment he devised for his AP class, measuring the moment of inertia of a hollow cone. He had found one plastic cone and is looking for more, of different dimensions. One suggestion was paper cones used for drinking water. If you know where he can obtain other cones, let him know. [dcahill@d127.ORG](mailto:dcahill@d127.ORG)

This ended the indoor part of the meeting. Our hosts had kindly set up several telescopes outside the school so that we could do some viewing of stars and of Jupiter before departing. Our thanks to all who contributed to a good evening of Physics phun.

## Come to New Trier! Bring friends!

Reported by John Milton

Future Meetings (Some dates to be determined)

**CSAAPT**, Saturday October 24, Lewis College, Lockport

**De Paul**, Tuesday, December 1

**Elmhurst**, Wednesday, January 13

**NEIU**, Thursday, February ...

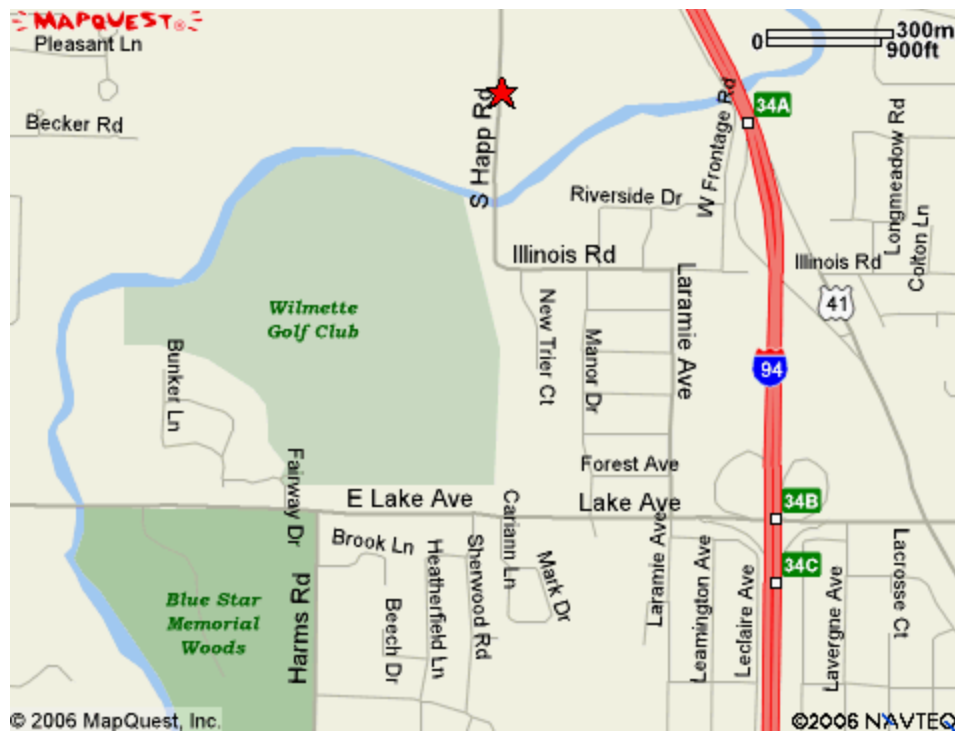
**Loyola**, Wednesday, March ...

**Lake Forest College**, Tuesday, April ...

**Northwestern**, Monday, May 3

**MSI**, Tuesday June 1 or 8

### Directions to New Trier – Northfield Campus



#### From the North:

Take I-94 south to Skokie Boulevard (exit 34A). The second light is Lake Ave. Turn right and go over the highway to Laramie. Turn right on Laramie. When Laramie ends at Illinois, turn left. Follow Illinois around the corner to the right where it changes to Happ Rd. The parking lot is on the left side of the street and the school is on the right.

#### From the South:

Take I-94 to Lake Ave (exit 34B) and exit westbound. Go over the highway to Laramie. Turn right on Laramie. When Laramie ends at Illinois, turn left. Follow Illinois around the corner to the right where it changes to Happ Rd. The parking lot is on the left side of the street and the school is on the right.

#### From the East or West:

Take Lake Ave. (Euclid in the Northwest suburbs) to Laramie. Turn north. Follow the directions above.