

OUR NEXT MEETING...

...is at **Chicago State University**
Thursday
September 27, 2012
6:30 – 9:00 p.m.

Scroll down for a map and directions.

Future Meetings

Oct 26-27	(Fr-Sat)	CSAAPT/ISAAPT Joint Meeting. Joliet Junior College
Oct/Nov (?)		Oak Park-River Forest High School (Kevin McCarron)
Dec 6	(T)	De Paul University (Eric Landahl/John Milton)
Jan 5-9	(Sat-W)	AAPT Winter Meeting, New Orleans
Jan 23	(W)	Elmhurst College, 39 th Annual Tri-Physics Meeting (Brian Wilhite/Venkatesh Gopal/Earl Swallow)
Feb (week of 15/22, M/W)		NEIU (Paul Dolan)
March (?)		Loyola U (Gordon Ramsey)
March/April ?? (SAT)		CSAAPT
Apr (9/16)	(T)	Lake Forest College (Bailey Donnally/Mike Kash/Scott Schappe)
June 4	(T)	MSI, tentative (Ruth Goehmann)

AT OUR LAST MEETING...

...at the **Museum of Science and Industry**, we were greeted by **Ruth Goehmann**, who showed us a number of exercises she does with school groups to help them understand rotational equilibrium. She showed us how she begins by asking them to balance a small on one finger – it looks easy with the stick horizontal, but then she asks about balancing the stick *vertically!* She showed us that to do this one adds a couple of weighted arms (a bent piece of flexible wire with a washer at each end). Then we saw some larger scale constructions illustrating the same idea – our giveaway was the sticks and other elements for making these.



A Dover book Ruth uses, *Easy-to-Make OLD FASHIONED TOYS*, (Eugene and Asterie Provenza) is a good source for these kinds of objects.

Announcements: **Paul Dolan** reminded us that new Reminder authors are welcome. **Ann Brandon** encouraged people attending national AAPT meetings to take part in the high school share-a-thon.

Brian Sievers (Alan B. Shepard HS) had connected the output of an i-Pod to a laser. The modulated laser signal was sent to a photodiode connected to a speaker and we heard the music. Brian also ran a comb across the beam and we could hear the “scratchy” sound that resulted. His students can easily assemble the breadboard circuits. They were able to mix signals from two laser sources. He has also had students speak into a microphone connected to the laser and plans to build an a-m radio transmitter. Brian adapted a \$1.49 generic dollar store laser. Contact Dsievers3@comcast.net for a parts list and schematic.



Larry Alofs (retired) referred to the transit of Venus (the spot on the sun) of June 5-6. He used some welding u-v filters to illustrate how one's eyes should be protected and said that a combination of a #19 and a #4 filter is recommended. Next, he asked us if copper can have more resistance than steel or iron. He showed us a flywheel with a copper coil wound around the perimeter. The coil is used to produce eddy current resistance in an elliptical exercise machine. The flywheel rotates inside a magnet array – Larry showed us this – the resulting eddy current produces a braking effect.



Stacy Ewing (Latin/HJ) showed us elements of a presentation that could be modified for use for the first day of school, an open house, introduction to waves, and scientific method. She begins with the limits of perception, pointing out that, due to u-v sensitivity bees and some birds see patterns on flowers that humans cannot see. Next she invites hypotheses about how the i-r signal from a TV remote control is “seen” by the set. She has tried to use an i-phone camera as an i-r detector, but found that it is not i-r sensitive. An older phone does work. In further discussion Larry Alofs suggested that a document camera could be used. In her PowerPoint Stacy shows a slide that reminds the viewer that white light has component colors. Then she shifts to sound waves and points out that elephants can communicate using very low frequency tone. To demonstrate this one can use an “High Frequency Tones” app for the i-phone. As an alternative approach to the question of why an i-phone doesn't work she uses a slide that shows the “scientific method” as a sequence of loops that finally leads to a theory. Stacy will send you the power point and notes: eqing.stacy@gmail.com. Ann Brandon noted that there is an i-r app for the I-Pad and thought it could be used in this exercise.

Bob Hurley (Proviso HS) told us of an upcoming program in July connected with Quarknet. Nate Unterman said that if this activity were to happen it would probably be at Fermilab. Perhaps at the September meeting someone connected with Quarknet can bring us up to date.

Art Schmidt (Northwestern U) set up a centripetal force demo from Cenco: two water-filled jars on the ends of a rotating bar. In each jar a float is connected to a string connected to the bottom (lid) of the jar. When the apparatus is made to rotate one can easily see the (paradoxical?) inward directed behavior of the floats. Ann Brandon pointed out that a clean peanut butter jar and a float, with instructions, are included in our New Teacher Bag. Next, Art showed us a two-color (red and green) laser. If both are turned on one sees the yellow mixing product. Art showed us that the green beam is not polarized and the red is partly polarized. He used a grating to illustrate the wavelength dependence on the separation of the interference maxima.



Paul Dolan (Northeastern Illinois U) worked with Martha Lietz's giveaway from the Museum meeting, blocks of Gulf Wax brand paraffin wax. We had seen the effect of looking at two blocks separated by a sheet of aluminum foil and observed that when the pair is set on a table the bottom block always looks darker. Paul used different materials to separate the wax blocks and got some interesting results due to the relative reflections and transmissions. He tried aluminum foil and a piece of overhead projector sheet, no barrier (air layer interface), shiny paper with black backing, aligned polarizers and crossed polarizers, green paper on one side and green filter sheet on the other side. These combinations produced interesting results and led to some good discussion of what was happening in each case.

Roy Coleman (retired) brought up the U-Tube version of the Eames' film "Powers of Ten." Then he told us of a more recent film related to powers of ten, sent to him by Lindsay Brubaker, from Willows Academy. You can see it at <http://htwins.net/scale2>. Some who had seen it thought it had a wrong value for the electron size (it gives 5×10^{-15} m; this is in fact close to the "classical electron diameter of 5.6×10^{-15} m. In any case, it is quite different from the original Eames film and well worth a look.

Andy Morrison (Joliet Junior College) told us of a free graphing calculator website, desmos.com. The website contains several examples, done mostly by students. Included in each example is the number of equations required to create the figure. He showed us one of these and we saw the figure created as the equations were evaluated and graphed. Then he went to the "launch calculator" command and entered an equation, which was displayed on the grid. He entered a second equation and it was also displayed, then he put in a constant that could be changed and the graphing program responded. It is also possible to display the sum of the equations. The program can convert equations written in LATEX to HTML5. Finally, Andy told us of an online chat group, globalphysicsdept.org, related to desmos.com.

Our final presenter was **Ben Cain**. Ben is in transition from industry to teaching and is going through the certification process. First he talked about a familiar conservation of energy demo in which a suspended bowling ball is allowed to swing away and back to the subject without hitting the person (if the person does not lean forward or the ball is not pushed!). He bought a bowling ball at a garage sale (\$15) and drilled a hole into which he put a screw eye and used safety cable for the suspension cord. (Roy Coleman suggested asking for a cracked ball at a bowling alley.) Then he connected the led from a flashlight to a digital voltmeter. When he illuminated the led with another flashlight we saw that there was a voltage of about 2.18 V across the led. He tried pulling the flashlight away from the and a graph of voltage vs distance was not an inverse square curve. This, we saw, was because the flashlight was not a point source. When he removed the lens from the flashlight he got a curve much closer to inverse square. Ben then tried the reverse process. He shone a red laser (640 nm) on the led and there was no voltage output, even if he increased the intensity by using two laser. Then he used a violet laser (405 nm). The photon energy was enough to trigger the transition from valence to conduction band and we saw a 2.27 V output. A green laser (~525 nm) did not work, so we knew that this photon energy also was not high enough. (There are several ways in which the led output can be "white" but we didn't get into this.)

Finally, **Ann Brandon** and **Gordon Ramsey** presented the *John Rush Award* for his outstanding support of ISPP to **Earl Swallow** of **Elmhurst College**. Earl successfully operated the apple peeler award amidst much encouragement and applause. Thanks, Earl, for all you have done for ISPP and good physics teaching. And thanks to Ruth Goehmann and the Museum for hosting our year-end meeting.

Reported by John Milton

ISPP on the web at <http://www.ispp.info/>.

Illinois State Physics Project Meeting
Thursday, September 27th, 2012
Chicago State University 9501 S. King Drive
Williams Science Center – Room 106
6:30 to 8:30 PM

<http://www.csu.edu/locator/index.htm> (includes driving directions and campus map)



Parking: Available in any lot except reserved lots, **\$5 on the CSU campus**

Driving Directions

From the far north, using Lake Shore Drive (41) south to connect to the Dan Ryan Expressway and at 95th Street, and take Exit 62.

From the southeast, southbound on Lake Shore Drive, Jeffery Boulevard south to 95th Street and west to St. Lawrence Avenue.

From the south, I-57 north to Halsted exit. North on Halsted to 95th Street and east to 95th and King Drive.

From the west, Eisenhower Expressway (290), east to connect to the Dan Ryan Expressway and at 95th Street, and take Exit 62.

Public Transportation.

Option 1:

Take CTA RED LINE TRAIN (RED LINE - SOUTHBOUND)

Depart: MONROE/STATE CTA

Arrive: 95TH CTA

Take CTA BUS # 111 PULLMAN 111TH 115T SOUTHBOUND

Depart: 95TH CTA BUS TERMINAL

Arrive: 95TH & KING

Option 2:

Take CTA RED LINE TRAIN (RED LINE - SOUTHBOUND)

Depart: MONROE/STATE CTA

Arrive: 95TH CTA

Take CTA BUS # 95E 93RD/95TH EASTBOUND

Depart: 95TH CTA BUS TERMINAL

Arrive: 95TH & KING