

OUR NEXT MEETING...

...is at

DePaul University

Tuesday October 18

6:30 – 8:30

Eric Landahl (773-325-3722)

Note: the LaDuke lecture is postponed**ISPP will be in the usual DePaul location Byrne Hall, Room 208**

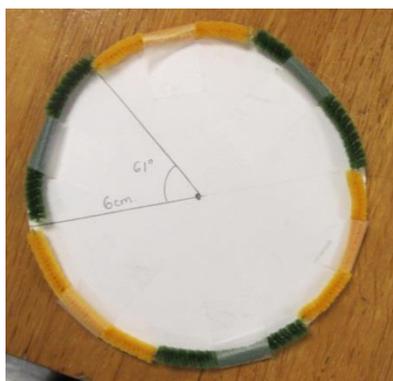
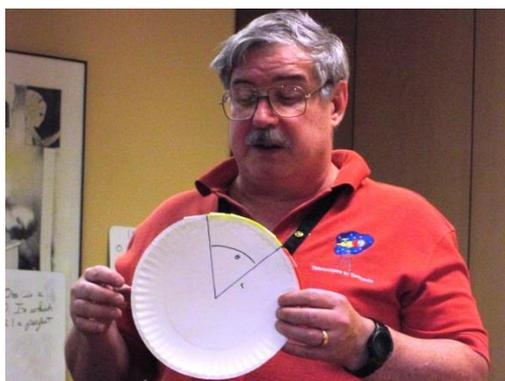
Future Meetings

Date	Location	Contact
November 12th (Sat)	Chicago Section AAPT Oakton Community College	Theodore Gotis
December 8th (Th)	Niles West HS	Martha Lietz
January (W)	Elmhurst College*	Brian Wilhite
February	Lane Tech High School	Karlene Joseph
March	Loyola University	Gordon Ramsey
April 12th (W)	Lake Forest College	Mike Kash
May 8th (M)	Northwestern University	Art Schmidt

*Tri-Phys Meeting

At our last meeting at Oak Park-River Forest High School... Martha Lietz (Niles West High School) reminded us that updated meeting calendars are available on her web site (just Google Martha Lietz). Our host, **Kevin McCarron**, told us about the “Sundays at Four” Enrichment Series at Aurora University. The presenter on April 9, 2017, is Brian Greene. Read about it at http://alumni.aurora.edu/s/1512/events_social.aspx?sid=1512&gid=1&pgid=868

Then Kevin showed us a paper plate with a piece of a “Chenille” strip (like a pipe cleaner) attached to the outer edge of the plate. The length of this piece was equal to the radius of the plate, so the subtended angle was one radian ($\sim 57.3^\circ$). Another plate had six arcs about equal in length, so each arc length was a little longer than a radius and the subtended angle was 61° .



Pete Insley (retired) pointed out that the number 121 (11^2) is a perfect square in base 10. He asked: in which other base or bases is 121 a perfect square? (See below for the answer.)

John Milton (DePaul U, retired) showed us a set of pastic eggs. He said that two of them, marked “7” and “11”, contained 7 and 11 identical small objects. A third egg contained an unknown number of these objects. John asked us how, without opening the eggs, to find the masses of the eggs and the individual objects, and how to determine the number of objects in the third egg. A small electronic balance was available. The physics teacher at Cristo Rey St. Martin College Prep (CRSM) in Waukegan, Kumkum Bonnerjee, has used this exercise both for a physics class and for an algebra class (as an example of systems of equations). If m_e is the mass of an egg, m_o is the mass of one object, n_1 and n_2 are the number of objects in each egg, and M_1 and M_2 are the masses of the egg-object combinations, then two mass equations can be written:

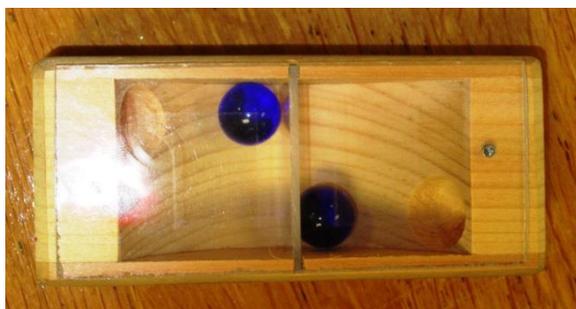


$$m_e + n_1 m_o = M_1 \quad \text{and} \quad m_e + n_2 m_o = M_2. \quad \text{In this case, } m_e + 7m_o = M_1 \quad \text{and} \quad m_e + 11m_o = M_2.$$

We measured the masses and came up with the required values. It was pointed out that the original use for these eggs goes back several years, in a simulation of the Millikan oil drop experiment. John said that the small objects are 8mm diameter steel ball bearings (Bag of 50 from American Science and Surplus for \$2.50) and the eggs are from Oriental Trading Company (144 eggs for \$10.75). Debby Lojkutz (Joliet West High School, retired) noted that the eggs can be obtained for lower prices shortly after Easter. John also described a number of graph activities (hands-on or supplied data) used at CRSM to give students data for several types of graphs.

Martha Lietz gave us each a puzzle; they were not identical. The object is to get two

marbles into their respective hollowed out spots in a covered box. Several people succeeded; I didn't.



She then described some open-ended problems. Example: A runner has an acceleration of 2.5 m/s^2 and has a maximum velocity of 7 m/s . The motion lasts 30 seconds. Give as much information about this motion as you can. She showed some examples of student work (groups of four). Martha recommended that we look at Appendix F, Science and Engineering Practices in the Next Generation Science Standards (NGSS).

Debby Lojkutz showed us a couple more lab measurement and graphing exercises. The first is like one that John Milton showed us. Given a number of circular plastic lids, the students use a ruler and string to measure the diameters and circumferences. Debby uses ticker tape instead of string. The slope of circumference vs diameter is π . Students can compare lengths and shadows in sunshine of sticks or poles of different lengths, as well as the height and shadow of a student, and from the length of its shadow use the same ratio to find the height of a lamp post.



Ryan Kruidenier (Whitney Young High School) pointed out that students can forget that both the magnitude of a force and the time over which the force acts effect the resulting motion. He blew a marshmallow out of a short piece of PVC pipe held horizontally. Then with the same blowing effort he used a much longer pipe. Of course we saw that the increased tme of contact resulted in a longer range. Ryan pointed out that one could also vary the angle. Neat!



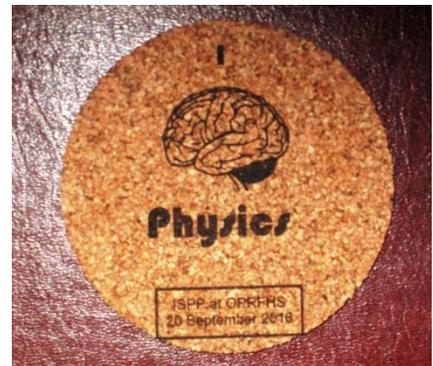
Pete Insley returned us to the question he asked near the start: In what base or bases is 121 a perfect square. Answer: any base.

$$n^2 + 2n + 1 = (n + 1)^2$$

Using a power point, Kevin McCarron gave us an interesting illustrated history of the particle vs. wave controversy about light. This included a nice description of the optics of the Fresnel lens. The controversy was finally settled by a key experiment by Fresnel, showing how waves can diffract around a small obstacle. Poisson showed why a bright spot (called the Poisson spot) should appear at the center of the circular diffraction pattern.



Kevin then produced the giveaways (plural!). We received a drink coaster with a design Kevin thinks may be due to Jim Vokak. Kevin cut the coasters on the laser etcher at Yerkes Observatory. The other giveaway was a cork embedded in a PVC pipe cylinder. A glass head pin is inserted in the cork. The Poisson spot can be seen if the pinhead is illuminated by a point source of light.



We saw an interesting variety of phenomena at this meeting and we're grateful to Kevin and OPRF for making us welcome.

Come to DePaul on October 18 for the LaDuke Lecture, and for phood and for Physics Phun amd Phenomena. Remember: **The Lecture begins at 6:00 in the Student Center.**

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

Reported by John Milton

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 mile 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.

