ISPP Reminder **January 2017**

OUR NEXT MEETING…

…is at

Lane Tech High School

Thursday February 16

6:30 – 9:00

Scroll down for directions and a map.

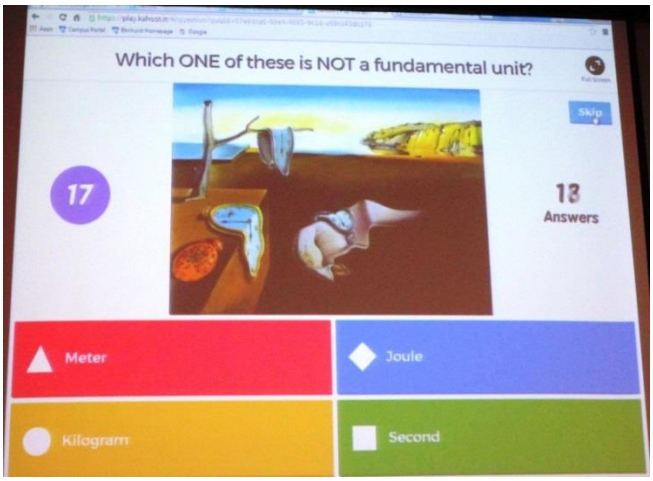
FUTURE MEETINGS…

DATE	LOCATION	CONTACT
March 7 (Tu)	Loyola University	Gordon Ramsey
April 12 (W)	Lake Forest College	Mike Kash
May 8 (M)	Northwestern University	Art Schmidt
Chicago Section AAPT March 18 (Sat)	Niles West High School	Martha Lietz

AT OUR LAST MEETING…

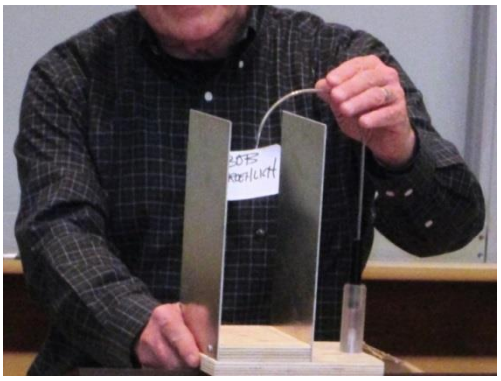
…at Elmhurst College on January 18, we gathered for pizza and conversation for the 33rd annual tri-physics meeting. Then **Brian Wilhite**, physics chair at Elmhurst, called us to order at 6:35. **Martha Lietz** (Niles West High School) told us of an active learning short course at the University of Oregon this coming summer (http://pages.uoregon.edu/sokoloff/CHAUT.htm). Martha also asked that we contact her with any ideas we have for topics and presenters at the Chicago Section AAPT meeting.

Debby Lojkutz presented new teacher bags to **Robert Hecht** (Grayslake North High School) and **Joshua Burton** (Proviso Mathematics and Science Academy).

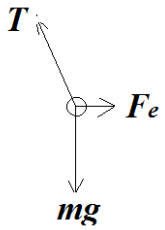


Carlton Rink (Timothy Christian High School) showed us some examples of Kahoot!, a free game-based learning platform. It allows for several options: time per question can be changed; a quiz can be rated; you can rate yourself; you can "steal" from others. (http://kahoot.it)

Mark Ailes (retired) described a device for introducing torque: a "comeback can." (Look it up on Google.) As the can rolls, the initial kinetic energy is transformed to potential energy and the can comes to a stop, then the potential energy is transferred back to kinetic and the can returns to its initial position.



Bob Froelich (Glenbrook North High School) pointed out that students can have difficulty with units that are less than obvious. It's harder for them to associate a quantity of charge with a charged object. He connected a high voltage power supply to a pair of parallel plates and hung a conducting sphere of known mass between the plates. The sphere was attracted to one plate, picked up some charge and moved away. At equilibrium the forces on the sphere are tension, electric, and gravitational.



The tension T in the string makes an angle θ with the vertical so $\tan\theta=F_e/mg$ and $F_e=mg\tan\theta$. The charge q on the ball is related to the electric field: $F_e=qE=qV/d$, where d is the horizontal distance from the ball to the plate. The charge on the ball is $q=F_e d/V$. The result from his measurement was q = 3.85 nC. (Bob did this analysis at last year's meeting.)

Bob told us that the position open at Glenbrook North is for one year, but could be longer.

Warren Lindquist (retired) brought his collection of *The Physics Teacher* and invited us to take any copies we might like. He had someone shine a blue laser on an inflated balloon and the balloon burst. (**Roy Coleman** pointed out that this laser may be of higher power than can be used safely and legally in a classroom.) Warren also had a wood block (piece of 2x4) with three strings attached, one to one end of the block, the othe two to adjoining sides of the block. He showed us that pulling on the two side strings could yield a net force equal and opposite to a pull applied to the end string.

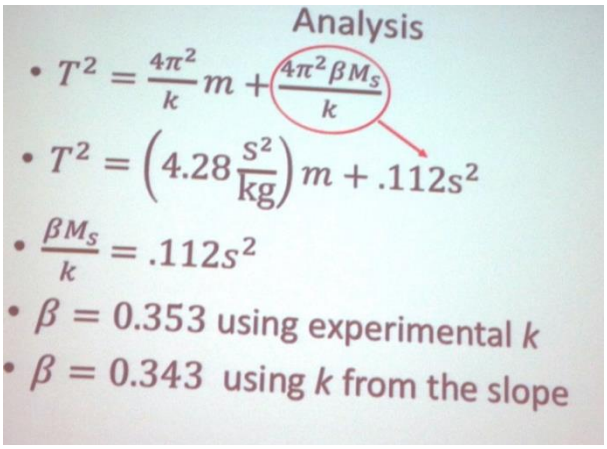
Chris Bush (Zion-Benton High School) had four identical incandescant bulbs in sockets on a plate. Two were brighter than the other two. When he removed a brighter bulb there was no change in the other bulbs. When he removed a dim bulb the other dim bulb went out. Ask the students to figure out the wiring. Roy Coleman suggested looking this up in the SMILE archives. Chris said he put a hole in the nose of a rubber ducky and used it to squirt water. He said he was planning to take students to the ISU Physics Discovery Day on January 28.

Dan Caldwell (Northside College Prep) had pliers, a soft iron bar, some pieces of a ceramic magnet and a neodymium magnet. He asked students to look at the possible interactions between these magnets and rate the three objects. They came up with 0: the soft iron bar; 1: the ceramic magnet (Alnico?), 2: the neodymium magnet. There was an interaction between 0 and 1 but the objects could be easily separated. 0 and 2 interacted more strongly and were hard to get apart. 1 and 2 interacted but not as strongly as 0 and 2. We agreed that in ferromagnetic materials there are there are magnetic dipoles grouped in randomly oriented domains. When in the presence of a strong magnetic field the domains tend to align. Joshua Burton reminded us that a full explanation of ferromagnetism requires the use of quantum mechanics. It was also pointed out that magnetic forces, which are perpendicular to a magnetic field, do not do work. Work is done by electrical forces.

Andy Morrison (Joliet Junior College) had what looked like a toy bug connected by a string to a small serrated wooden rod. He used the rod to make the bug rotate and we heard a noise that may have come from the rod. Andy didn't know the source of the toy and no one could help on this. (A search of Oriental Trading Company brought no results.)

In his course on sound Andy has students design and build a working musical instrument as a semester-long project, using "primitive" materials. He showed us a pvc pipe flute with a dowel mouthpiece. He was able to get tunes from the flute that had no tone holes. Then he showed us the use of a microphone input projection that has a built-in FFT.

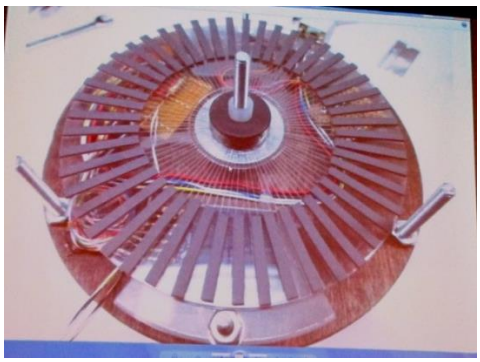
Mark Welter (Prospect High School) pointed out that the period of a vertical spring and mass system should include 1/3 the mass of the spring. He showed us a derivation for the square of the period as a function of the spring mass. Data from period measurements yielded a factor very close to 1/3.



Stewart Brekke (retired) distributed an abstract submitted for a meeting of APS: *Total Energy at Low Speeds Relating to Mass Energy Equivalence Must Include Linear, Rotational and Vibrational Kinetic Energies.* With $E = \gamma m_0 c^2$ expanded as a Taylor series, and keeping the first two terms, the equation should be: $E = m_0 c^2 + \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2 + \frac{1}{2}kx_0^2$.

Nick Szarzak (Glenbard West High School) passed around a cube of 99% pure tungsten (density 19.25 g/cm^3). It was gray and one could tell by hefting it that it is much denser than water! Then we saw some video samples from Molecular Expressions (Florida State U): *Powers of 10*, and an interactive Java tutorial *Perspectives: Powers of 10*; a You Tube clip, *Hamster Exercise Ball*, in which a toy hamster resting on a large exercise ball rebounds a large distance when the ball is dropped on the floor. He mentioned the demo in which a stack of balls is used. Nick showed us a simulation of exploding carts on Physics Classroom.

Dave Schultz (Maine East High School) told us he built a device for a telescope he made. It measures the angular position of the scope in 1° increments. There is a rotational encoder on each axis connected to a music cd. Photo sensors measure angle and direction using quadrature encoders. See www.creative-robotics.com/quadrature-info



Kevin McCarron (Oak Park-River Forest High School) gave us a handout on a 20-cent paper centrifuge that uses a child's toy ("whirligig"), developed by a Stanford engineer, Manu Prakash. It refers to the "Foldscope" that he developed previously. See Google and YouTube on these. The Foldscope is a low-cost origami-inspired paper microscope. Brian Greene will speak at Aurora University at 4:00 pm on April 9. The Yerkes Observatory book club meets Saturday, February 18th, 10am–4pm. Referring to a collision involving LeBron James, Kevin asked: did he fall as a result of the collision, or did he flop? We did not arrive at an answer.

Jeff Tieman (Maine West High School) described Safe Share, a free program for teachers that allows the use of a You Tube video without displaying the related videos and associated comments. He told us he uses "differential instruction" to help students review. He emphasizes giving help to "lower" performing students and encourages them to help each other.

The **Harald Jensen** award winner is **Geoff Schmitt** (Naperville North High School). The award will be presented at the Lake Forest College meeting, April 12.

Reported by John Milton, with the assistance of notes by Kevin McCarron.

LANE TECHNICAL HIGH SCHOOL
2501 West Addison Street
Chicago, Illinois 60618 (773)
534-5400 Fax (773) 534-5544

If you are traveling city streets: Addison Street is 3600 North; Western Avenue is 2400 West.

Using the CTA: The Brown line stops at Addison and Ravenswood. Lane Tech is about a mile west at Western; the #152 Addison bus can take those of us not training for the marathon. From the North and South, the #49 Western bus runs right past us.

From the South: Take Lake Shore Drive North and exit at Belmont Avenue. Go west on Belmont (L) until you reach Western. Go north on Western (R). Turn left into Lane's lot after you go through the Roscoe intersection. If you get to Addison you have gone too far. OR Take the Dan Ryan Expressway North (I90). It becomes the Kennedy Expressway after you pass Downtown. Exit the Kennedy at Fullerton/Western (47A). You will drive through the first stoplight to get to Western Avenue. Go north on Western (R). Turn left into Lane's lot after you go through the Roscoe intersection. Make a left turn into the parking lot. If you get to Addison, you have gone too far.

From the Southwest: Take the Stevenson Expressway (I55) North and follow the exit for I90/94 Wisconsin. This will put you on the Dan Ryan Expressway North. Follow the Directions above from here on in.

From the North: Take Lake Shore Drive South, exit on Irving Park Road. Go West on Irving (R) until you reach Western. Go south on Western (L). After you go through the Addison Street intersection and pass the school building, make a right into the Lane lot.

From the Northwest: Take the Edens South to the Kennedy Expressway East. Exit at Addison (L). Go east on Addison until you reach Western Avenue. Go south on Western (R) and turn right into the Lane lot after you pass the school building. OR Take Kennedy eastbound to Addison St. exit. Go eastbound on Addison to Western. Turn south on Western (R) one block to the parking lot entrance. Turn right.

From the West: Take the Eisenhower Expressway (I290) east to the Kennedy. Follow the directions for the Kennedy Expressway West from above.

Directions from I-94: Exit at Addison, go east until Western; turn right (south) at Western.

Directions from Lakeshore Drive: Exit at Irving Park, go west until Western; turn left (south) at Western.

Warning: There are speed cameras speed cameras on both Addison (just west of Western) and Western (just south of Addison.)

The parking lot entrance is on Western, just north of the Jewel parking lot. Enter the building through door "M" which is the parking lot door. There will be signs from there.


W Grace St
W Bradley Pl
W Waveland Ave
W Addison St
W Cornelia Ave
W Roscoe St
W School St
W Patterson Ave
W Eddy St
N Talman Ave
N Rockwell St
N Campbell Ave
N Artesian Ave
N Western Ave
N Claremont Ave
N Oakley Ave
N Leavitt St
N Bell Ave
N Hamilton Ave
N Hoyne Ave
N Seeley Ave
N Damen Ave
N Wolcott Ave
Ravenswood
W Irving Park Rd