ISPP REMINDER

HAPPY NEW YEAR ! !

OUR NEXT MEETING. . .
the 30th (?) Annual Tri Physics Meeting: ISPP, Physics West and Physics Northwest

. . . is at

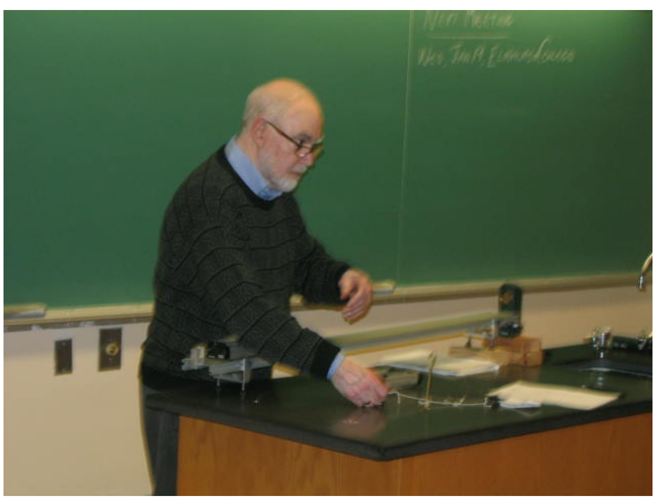
Elmhurst College
Wednesday
January 15
NOTE TIME -------- 5:30 - 9:00 p.m.
5:30 for Pizza before the regular meeting at 6:30.

THE FREE GIVEAWAY **. . .**
. . . is always a neat thing at Elmhurst, thanks to the ingenuity of Earl Swallow our host there! Can you guess what it will be?

Map and Directions are at the end.

AT OUR LAST MEETING . . .

…**John Milton** welcomed us to DePaul University and introduced Susan Fischer, and Ton. Eric Landahl was a new teacher who graduated from Morgan Park High School in 1990 and also worked with Tony Behof.
John Milton (DePaul University (ret)) greeted us and introduced the department chairman, Jesus Pando who introduced us to the Physics Department faculty, Susan Fischer and Mary Bridget Kustusch. Eric Landahl was presently in Korea but created our free giveaway before he left. Next meeting at Elmhurst College Wednesday January 15. Mary Bridget, Roxan Castro, Fabian Obando, and Camille Powel received a New Teacher Bag from Debbie Lojkutz.



John recalled a PSSC Physics centripetal force activity that used a short glass rod with a string passing through it. The string had a rubber stopper tied to one end and a mass at the other end. The student would launch the stopper into a horizontal circle using the rod held vertically as a bearing. The string passing through rod hung vertically down with a mass at the bottom end providing a known centripetal force with the weight of this mass. John could not find the right glass tubing but did find that Sargent Welch sold the device for $8 a piece. The only snag came when he found out that they charged $40 handling and shipping. John found everything he needed at American Science and Surplus, an eye dropper, a rubber stopper for the swinging mass and washers for the weight for a grand total of $13.33 for all. He demonstrated the device by swinging the tethered rubber stopper over his head in a circle. Measure the period and radius and derive the centripetal relation. Ann Brandon suggested using a BIC pen tube for the bearing. She also recommended sticking a piece of tape on the vertical string just below the tube as reference to help keep the radius constant.

Peter has student feel the centripetal force as a function of all the factors before writing down an equation. Art Schmidt said he shows his students the equation first and asks what is says about the relation was between radius and speed. Everyone agrees that the speed should get smaller with smaller R, but when they observe the actual motion, they are convinced that the speed increases as the radius increases. Art then uses a strobe shining on the ball to show that the speed does indeed slow down. They were focusing on the angular speed and not the tangential speed. Martha Lietz has her student take a bowling ball into the hall and try to keep it rolling in a circular path. They find that they need to constantly provide a push toward the center of the circle, thus getting a real feeling about the direction of the centripetal force required for circular motion.

John recalled a Pete Insley quote when asked for the name of a good physics text. “Any text will do since all they are used for is to hold up one end of an inclined plane.” With that John showed us his second phenomena. He had used a PASCO track as an incline. At the top of the incline he had positioned a position sensor looking down the track. The idea was to ultimately measure the acceleration of a PASCO cart acting against the motion as it went up the track decelerating and then accelerated down the track. Which value, the deceleration down or acceleration up will be greatest. On the way down friction and gravity oppose one another while on the way up they act in the same direction. John mentioned that the carts weren't completely frictionless compared to a glider on an air track. Without friction the acceleration would be equal to g sin (θ) in either direction. John gave the cart a push up the track and recorded the motion. The position versus time was fairly symmetric and quadratic, while the velocity curve had a pretty uniform line to indicate a uniform acceleration throughout the motion. Then he added a friction pad and asked what will happen. He displayed the results. Now the position curve showed the same quadratic curve it was not symmetric around the point of highest travel, the deceleration part being more sharply curved. The velocity plot showed a clear change of slope at the acme, with the steeper slope initially and a flattening of the line for the downward leg, a neat visualization of a popular problem. He then fit the two halves with separate quadratics. Clearly the upward part of the motion had a greater acceleration. John said that he had a difficult time trying to get a consistent value for the frictional force. Ann Brandon mentioned how one could measure air friction using coffee filters dropping on to a motion sensor. John observed that air friction is more complicated being velocity dependent. Ann pointed out a way to make measurements without a motion sensor, by noting how much further up one has to drop two coffee filters such that they land at the same time a single filter is released. John noted that motion analysis could be done with a video camera whose frames can be analyzed with Logger Pro.

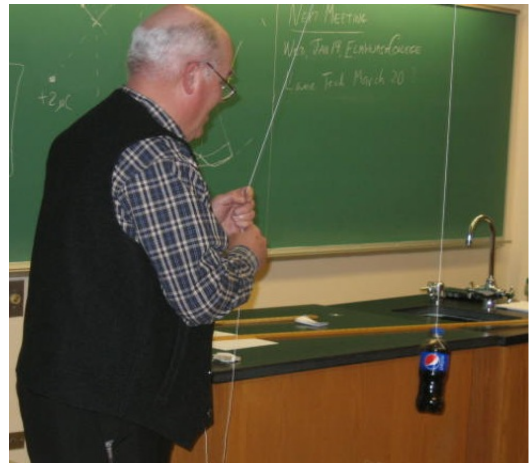
Art Schmidt (Northwestern University) related that he had just returned from a month long trip during which he voyaged on a four-masted 360 foot Barkentine retracing the path that Columbus had taken to discover the Ne World. Half way across he saw a total Solar Eclipse. He had mentioned to the cruise director that he had a talk he routinely gave to his class on Columbus Day explaining the physics of sailing and how it was that Columbus could sail to the New World and … get back. One of the things he talked about was the bollard, a post usually found on a pier where sailors would wrap a rope around from a docking ship. The friction generated by the tension in the rope increased exponentially with every wrap, such that with only two or three wraps around the bollard a single seaman could hold fast a huge ship. One of the professors at Northwestern University had him make a demonstration Bollard that he brought with him to the meeting. He didn't have a bollard for his talk on the voyage so he used a nearby support pillar. Art produced a rope and wrapped it around his bollard and challenged any two or three people to come up and pull the rope away while he supplied the tension with his pinky finger. It worked. They could not budge the rope. Then Art told us about two other demos he scraped together for his talk. He had wanted to show Bernoulli's Principle by blowing over the top of a sheet of paper to make it rise up. The dining hall tables had sheets of non-slip paper place mats to keep the glasses and tableware from sliding around has the ship rolled with the waves. Before the talk he had placed a mat nearby and positioned some items on top. When it came time to use the paper he snatched a mat out from under the items ala the tablecloth magic trick. Despite its intended use to prevent slipping he was able to slip it out from under the items successfully.

Martha Lietz (**Niles West High School)** has to work in more INQUIRY labs. She cited from the site 'Advances in AP'. The site describes four types of labs; confirmation lab, structured inquiry, guided inquiry, open inquiry. 'When Pigs Fly' is her attempt at guided inquiry. A battery operated pig flaps its wings. It hangs from a string attached to a ceiling mount. The flapping wings give the pig enough forward motion to move in a conical pendulum. Students are allowed to make measurements with only a meter stick to predict period. Martha showed a video of students attacking the problem and passed out a copy of the exercise. Martha showed us the pertinent equations .

Susan Fischer (De Paul University) found a more efficient way to present worked examples. In a paper she read some educational researchers were studying students reading and comparing examples side-by-side or sequential. Analysis if side-by-side examples seemed more effective than when examples were presented sequentially. Susan adapted this to her worked examples. She had written out examples, one set where two ways of doing a problem were side-by-side and one sequentially in comparison with another. Sometimes one is right and another is wrong. Sometimes they consisted of two different approaches. She demonstrated for us an example for finding the electric field for a symmetric arrangement of point charges. She has added human interest by introducing an antagonism between personalities Bob and Nora representing the two versions. She aims to get her students to critic each method rather than just cut and past solutions into the situation. Susan passed out an example.

Ann Brandon (ret) was reminded of Tomy Toy by a toy she got atToys 'R Us a Press and Go for $6. She pushed down on the head and released it, W Her students would attach ticker tape and cut lengths of tape into tenth of a second sections. They woukd tape them next to each other to make a plot of velocity versus time. Each length of tape is the length traveled in a tenth of a second so the plot would be of the velocity. Science Kit still sells simple ticker timers. A measure of the deceleration gives you an idea of frictional force. Discussion ensued about merits of doing measurements in such an elementary way first before graduating to more sophisticated but less intuitive computer data acquisition system.

Bill Blunk (ret) tied a string to a pop bottle and ran the string over a rod near the ceiling. Never knew a student that didn't know how to pump a swing but know one could explain the physics involved in pumping a swing. He has a four-year old granddaughter who loves pendulums. She knows some intrinsic fundamental phenomena like you spin faster as you pull in your arms, or that on a swing they both have the same period regardless of their weights. With his arrangement he could pull on the string to raise or lower the pop bottle. Raise it up at the point of fastest velocity near the center of the arc, and lower back at a point where there was no velocity at the extreme. He demonstrated and within a few swings we could see the increased amplitude of the swing.



Then it was time for our giveaway. John brought out a Bunch of Tantalus (or Pythagorean) cups that Eric had 'printed' on their 3D printer. These cups have a syphon built into them so that they will hold liquid when filled half way. But fill them to the brim and you fill the syphon and the cup empties. Eric pointed out in the handout that the 3D printer allows you to incorporate the syphon into the design in a way that is not obvious and when activiated, the syphon empties the cup completely. The original Tantalus cup had a cemtral post the aroused suspicion that something was afoot. Martha had originally introduced us to the cup in a past meeting. What a neat giveaway.

Submitted by Art Schmidt

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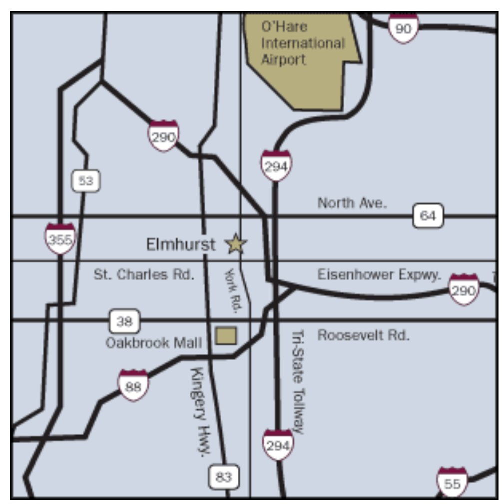
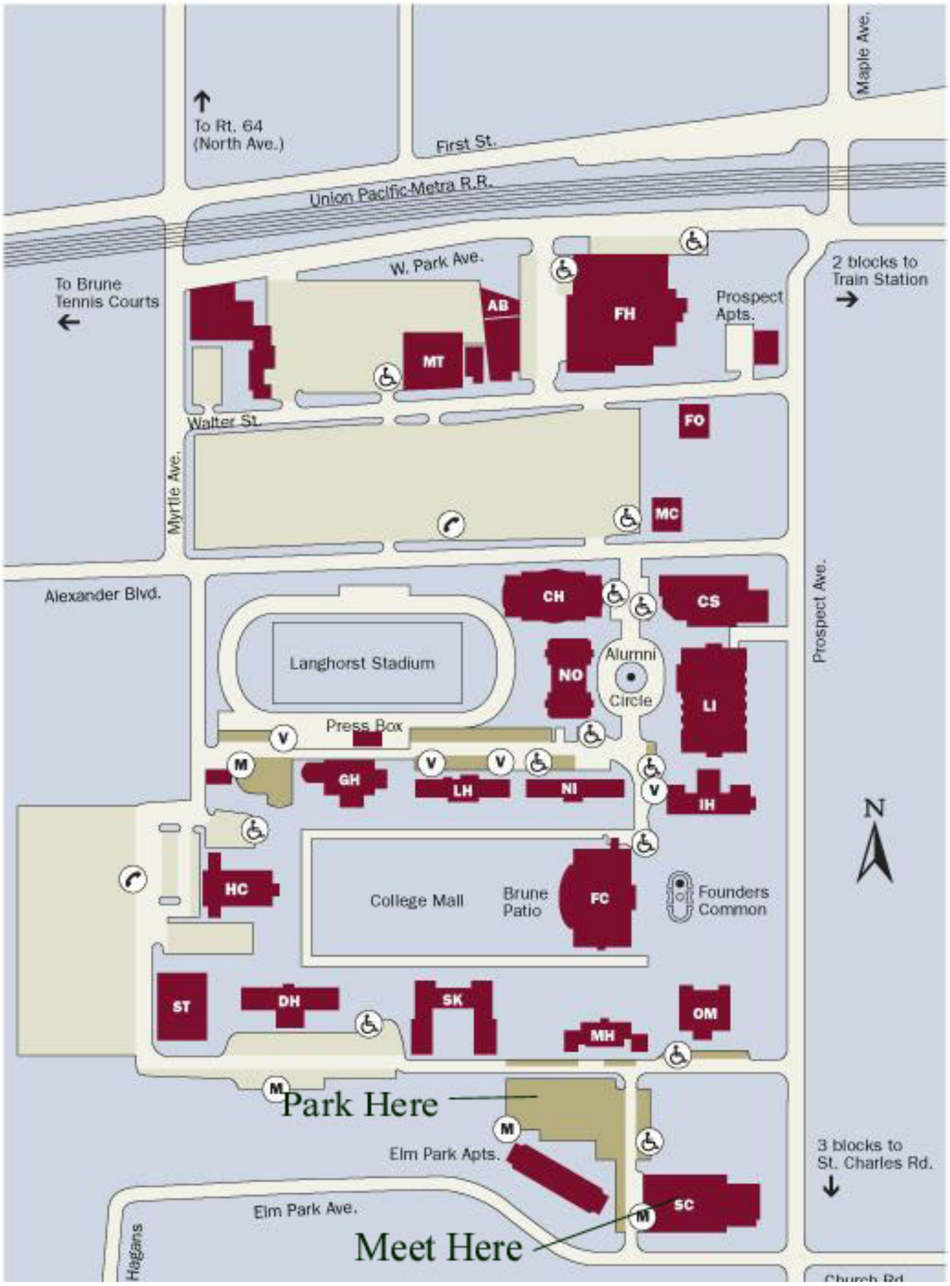
Directions to Campus



By way of Interstate 290 (Eisenhower Expressway)
* Exit at St. Charles Road, just west of I-294
    * Travel West on St. Charles, past York Road, to Prospect Avenue
    * Turn right onto Prospect for two long blocks, past the front of the campus on your left, to Alexander Boulevard
    * Turn left onto Alexander Boulevard, then right again, into the main parking lot

By way of Interstate 294 (Tri-State Tollway)
    * From the south, exit at I-290
    * From the north, exit at I-290 West, then exit again immediately at Illinois Route 64 West (North Avenue)
    * Follow North Avenue about a half mile, past York Road, to Maple Avenue
    * Turn left. Follow Maple Avenue another half-mile, two blocks past railroad tracks to Alexander Boulevard. (Maple Avenue becomes Prospect Avenue after the tracks)
    * Turn right onto Alexander Boulevard, then right, into the main parking lot

By way of Interstate 88 (East-West Tollway)
* Exit at York Road, just west of I-294. (Take ramp marked I-294 South)
    * Travel north on York for about two-and-a-half miles to St. Charles Road
    * Turn left on St. Charles to Prospect Avenue
    * Turn right on Prospect for two long blocks, past the front of the campus to your left, to Alexander Boulevard
    * Turn left onto Alexander Boulevard, then right again, into the main parking lot



To Rt. 64
(North Ave.)
First St.
Maple Ave.
Union Pacific-Metra R.R.
W. Park Ave.
To Brune
Tennis Courts
AB
MT
FH
Prospect
Apts.
2 blocks to
Train Station
Walter St.
FO
MC
Myrtle Ave.
Alexander Blvd.
CH
CS
Langhorst Stadium
NO
Alumni
Circle
LI
Prospect Ave.
Press Box
V
M
GH
LH
NI
IH
HC
College Mall
Brune
Patio
FC
Founders
Common
N
ST
DH
SK
MH
OM
Park Here
Elm Park Apts.
3 blocks to
St. Charles Rd.
Elm Park Ave.
SC
Meet Here
Hagans