OUR NEXT MEETING…

…is at
Lane Tech High School
Thursday February 18
6:30 – 9:00

Scroll down for directions and a map.

FUTURE MEETINGS…

Date	Location	Contact
February 18	Lane Tech High School	Karlene Joseph
March 9	Loyola University	Gordon Ramsey
April 20	Lake Forest College	Mike Kash
May 2	Northwestern University	Art Schmidt

AT OUR LAST MEETING…
**…**at **Elmhurst College** on January 20,

…we found pizza and soft drinks awaiting us, along with colleagues from Elmhurst. The pizza and soda were courtesy of Joe Mayer, now retired. Joe was one of the original members of ISPP and was the first high school teacher to be elected national president of AAPT. Thanks, Joe, both for the treats and for your many contributions to physics teaching.

We were welcomed to the 32nd annual Tri-Physics meeting by **Brian Wilhite**. Following some announcements a new teacher bag was presented to **Jan Wieczorek** from Ridgewood High School.

Carlton Rink (Timothy Christian High School) gave us a handout, "Phlipping Physics," In this format, now in use in many schools, course content is presented through video and text materials outside of class, and class time is devoted to laboratories and demonstrations, review, and problem work. Carlton makes his own videos (6-18 minutes in length), available on Carlton Rink Youtube. The reverse side of the handout was a typical work sheet for students to use while watching a video. He checks these in class and assigns a grade for completion. For more information: rink@timothychristian.com.

Bob Froelich (Glenbrook North High School) pointed out that students can get a "feel" for what a newton of force is by hefting a kilogram mass and hanging it from a spring balance. But, he said, it's not so easy to do this for a Coulomb of charge. But he noted that a standard demo of electrostatic force can be made quantitative. A pithball hung from a string will be attracted to a charged plastic rod, touch it, and then be repelled. He connected a pair of parallel metal plates on a wood base to a 5000 V power supply. As he increased the voltage the pithball was attracted to the positive plate. He projected the shadow of the apparatus on a whiteboard and drew the vector diagram.
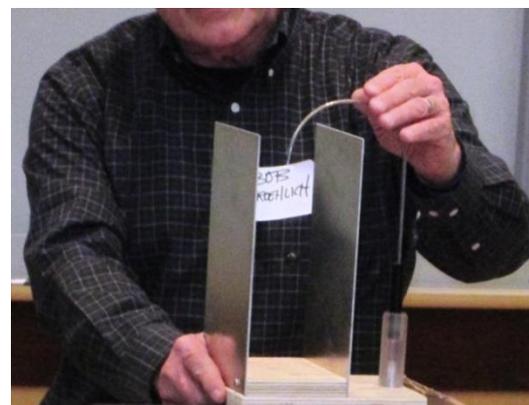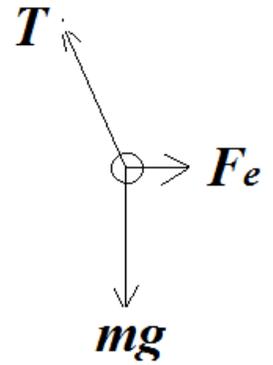
The tension T in the string makes an angle θ with the vertical so $\tan\theta = {F_e}/{mg}$ and

$F_e = mg\tan\theta$.

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 results from his measurement was $q = 3.85$ nC.

Chris Aderhous (Glenbard East High School) worked out a calculation of the number of classes available for an intro physics course, covering essentially the same material, at the high school and college levels. It looks like the college to high school ratio is about 192 to 155 days.

Roy Coleman Morgan Park High School, retired) showed us two rolls of toilet paper and said they could be used to help students remember what a field represents in computer science. Then he gave us a handout that he used for two at-home assignments. The first was "The Analysis of a Common Household Necessity." Using a ruler and a stop watch/timer, the student is to measure the depth of water in the toilet tank as a function of time for a complete cycle (one flush to readiness for the next flush) in two second intervals. He showed us some of the incorrect graphs that students produced. The other activity was "Volume of Air in the Bathroom." This requires that the student to calculate the volume of air using the room's dimensions, then subtract the volumes of all objects that take up space (e.g., a water-filled bathtub). A report is requires: purpose, procedure, scale drawing of room, data table, calculations, result, conclusion.

Josh Norten (Cary-Grove High School) set up a ballistic pendulum. The swinging object (pendulum bob) was made from the bottom of a plastic water bottle with some paper stuffed into the open end. Josh used an inexpensive toy gun to shoot a projectile into the open end and we saw the inelastic collision that resulted. He repeated the process, but fired into the closed bottle end; the collision was closer to elastic. It is assumed that momentum is conserved in both cases and that the bob's initial kinetic energy equals the final potential energy. The initial velocity of the projectile can then be calculated. The student is asked to find the muzzle velocity by another means.

Chris Aderhous showed us something he uses as part of AP physics review. He laid a BIG cardboard tube across two tables and wound the cord of a pair of earphones around the center of the tube. He led us in a discussion of the accelerations present when to tube rolled and the cord unwound. We also identified the forms of kinetic and potential energy changes.

Ann Brandon (Joliet West High School, retired) shared some things she picked up at the winter AAPT meeting: a booklet ("7 Myths About High School Physics," photo contest pictures and calendar, the last page ("Backscatter") from the December *Physics Teacher*, and article on the Tacoma Narrows bridge that identified errors of the initial analysis due to using incorrect frames/sec values, and an interesting collection of old and new Coca-Cola bottles.

Scott Beutlich (Crystal Lake South High School, retired) showed us a Power Point from his trip to Europe: "*A Visit to Tesla's Home Town.*" His narration was helpful in identifying the many places he visited that had connections to Nikola Tesla..

Karlene Joseph (Lane Tech High School) set up a Pasco motion detector. She said she prefers lab activities that are not totally teacher-driven, with a goal that students have experience in setting up a lab, collecting and interpreting data. She had a set of wood blocks of different thicknesses and we saw the *v* vs *t* graphs when they fell. The slopes varied from lower than to higher than *g*. She was pleased when students looked for reasons why their values were not always very close to 9.8 m/s^2. Then she dropped coffee filters and we saw that the terminal velocity reached depended on the number of filters. She asks a bonus question: from what height should two filters be dropped so that they land at the same time as one filter dropped one meter? She showed us that the required height is about 1.4 m. Can you show that this is related to the square toot of 2? Remember, terminal velocity is reached when drag force equals the weight force.

John Lewis (Glenbrook South High School) asked: What is the maximum acceleration a person can withstand? We agreed that it would be about 10*g*. Then John asked, in the light of the new Star Wars movie, how long should one take to reach light speed, starting from rest? A quick calculation yielded:
$v = at \quad 3 \times 10^8 = 10^2 t \quad t = 10^6 s \approx 30$ days!
"But what about relativity?" someone asked. What do you think?

John gave us a handout some of us had seen at the Chicago AAPT Section meeting, on Making a Paper Rocket. The launcher is made mostly from PVC pipe. Two plans for a launcher are at

https://www.youtube.com/watch?v=90gextdVorM   and

https://www.youtube.com/watch?v=9AKM2UksvSk

First, John rolled a sheet of paper into a cylinder and closed the top with tape. He launched with a pressure of about 30 psi (about 10 psi/pump with his pump). The "rocket" easily went to the back of the lecture hall. Then he followed the instructions on the handout and made a rocket with four fins. This traveled faster and farther. He left us with a question: Would a rocket of heavier paper, but shorter, so that the masses were equal, be faster or slower than the less massive rocket?

The final event was the announcement of this year's winner of the Harald Jensen Award. After a brief review by Ann Brandon of the origin of the award and the influence of Harald on the early days of ISPP, Debbie Lojkutz announced the winner, from Physics Northwest: **Chris Bruce** of **James B. Conant High School**. Chris was unable to attend, but the formal presentation will be made at the April 20 meeting at Lake Forest College. Congratulations to Chris.

Thus ended an evening of interesting and useful physics. Our thanks to our Elmhurst hosts and to Joe Mayer. Come to Lane Tech for more phenomenal physics. Bring a friend; bring a phenomenon.

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.