

ISPP REMINDER

June, 2012

OUR NEXT MEETING ...

...is at **Museum of Science and Industry**

Tuesday

June 5, 2012

6:30 – 9:00 PM

Scroll down for a map and directions.

AT OUR LAST MEETING...

...**Martha Lietz** (Niles West High School) introduced the crew of Niles West, both physics and astronomy. Then she pulled out a block of paraffin wax (Gulf Wax brand) that looked like two pieces 6cm x 6cm x 4cm thick. The bottom half looked darker when she set it on the table. Then she turned it over and the bottom half was still darker. She asks her students to place the block with the dark side down and they find they can't do anything else. No matter which 6x6 face they set it on, the dark side is down.

Martha then placed the block on various colors of paper and the bottom remained dark but picked up a tint of the paper color. Someone brought a laser pointer which lit up either the top or the bottom but not both. Martha confessed she put a sheet of aluminum foil between two 2-cm slabs of wax before she fused them together.

Various people produced red, green, and blue laser diodes and directed their beams into various sides of the block as the audience tried to see if we could detect color adding. Some said they could, but I couldn't see much.



Martha then brought out a 100-watt incandescent light and a 23-watt (100-watt equivalent) compact fluorescent light, CFL, and placed them 2m apart on the demonstration table. She move the block between them until both

sides looked equally illuminated. Then $\frac{I_1}{d_1^2} = \frac{I_2}{d_2^2}$

Be careful here to use Intensity in Lumens which is given on the bulb box and not power in watts. Also CFL needs time to reach maximum brightness. It worked pretty well.

Martha passed out instructions she got from “Science Buddies” on the Joly Photometer which explains everything including making the blocks. Then she announced that she made blocks for each of us to take home at the end of the meeting!!! Yay Martha!

Robert Foster from Zion Benton High School visited us for the first time and got a new teacher bag.

Various meetings were announced including Physics Day at Great America, the summer AAPT meeting in Philadelphia, etc.



Last month when **Debbie Lojkutz** (Joliet West High School) was demonstrating the phone cord waves, **Roy Coleman** (CPS retired) held the cord vertically to show you could produce standing waves with a free end. **Pete Insley** (Columbia College) brought his plastic Slinky and repeated this, pointing out that the distance between the nodes was much smaller towards the bottom end. It was generally agreed that this was because the tension in the spring was smaller there and the mass per unit length larger.



Rich DeCoster (Niles West High School) is part of the astronomy department at Niles West and he brought out a hydrogen spectrum tube and pointed out that the gas was transparent. He asked at what temperature would the gas become opaque? Rich did a Boltzman Distribution to find out what percent of the gas is ionized and what percent excited at various temperatures. He tried 300°K, 2000°K, and 3000°K and found a sharp transition at 3000°K when almost all the gas is ionized and so opaque. This is the temperature at which the early universe became transparent and is as far back as telescopes can see.

Rich also had a CFL light and a background of white paper. He passed out diffraction gratings and we saw clear images of the light in reds, greens and blues. When he put box on our side of the light it made images against the paper of yellow, magenta and cyan as the black was blocking some colors on the white background.

Bill Blunk (retired) brought a “hoey stick” – Google “gee-haw whammy diddle” for more information. It’s a 30cm long dowel about 1cm square with notches cut along one edge and a propeller on the end. He strokes it with another small dowel about 10cm long and half centimeter diameter. At first the propeller shook but did not rotate. Then Bill said “Physics” and the propeller began to rotate clockwise. When he said “Physics” again the propeller rotated counterclockwise.

Bill showed us the trick. When he wanted the propeller to rotate clockwise he rubbed a finger along the side of the long dowel as he stroked it. This caused it to rotate in a small circle instead of just up and down. When he wanted it to go change direction he rubbed the dowel with his thumb.



Bill then set out to demonstrate his explanation. He attached a block with a mirror to the long dowel and clamped it down. He directed a laser pointer to the mirror and off it to the back wall. When he rubbed without touching the dot went up and down, but when he touched with his finger as he rubbed it formed a small ellipse. As he rubbed it with his thumb the ellipse reversed. The added weight of the block and mirror made the whole thing hard to operate so Bill made another “hooley” without a propeller and glued a small mirror to the end. This also worked but not much better than the mirror on the block. Both demonstrations made it clear that the finger rubbing was causing the “hooley” to rotate.

Bill also recommended www.surplussed.com for a nice eyepiece that costs \$62.50 retail for \$35. They have lots of stuff at good prices.



Karlene Joseph (Lane Tech High School) brought a video clip from a Harry Potter movie in which someone attempts to break a wineglass by singing. She then showed one from MythBusters in which one is broken by a speaker. The film is slowed so you can see the vibration modes of the glass.



Karlene has a few wineglasses that she lets the class use to rub their fingers around and set up resonances. She also has some tubes about 30cm long and 3cm in diameter. Some she taped together

to make 60cm tubes. The students put the tubes to their ears and can hear differently pitched resonances. Karlene also mentioned the difficulties of teaching a sound unit to her deaf students and some of the tricks she used. One trick was an iPad app that shows the wave pattern for different sounds the iPad hears. It works like the oscilloscope demo we used to use. A tuning fork rung over the iPad in frequency mode showed a peak at the tuning fork pitch.

Joe Serpico (Niles West High School) had a coil and neodymium magnet and a magnetic field probe attached to a Logger Pro program on the computer. When he moved the magnet into the coil he could record the change in magnetic field, time, and voltage and draw graphs of field and voltage showing they had the same shape slopes. Faraday’s Law.



Elizabeth Ramseyer (Niles West High School) is the other half of the astronomy department and she discussed the solar eclipse due on May 20 which will be a partial here in Chicago. She recommended some websites. If you go to the Niles West High School website and look her up there is lots of additional information. She also mentioned that this June 5, 5pm to sunset is the last time this century you can watch a transit of Venus. It’s a long wait until the 2100s if you miss it.

Kevin McCarron (Oak Forest River Forest High School) showed a short video clip of someone taking a dozen green light sticks and blending them. Then he took a blue, a green, and a red light stick and broke and shook

them. We turned out the lights and they glowed nicely. Then Kevin cut the tips off and emptied them into three small beakers through strainers that caught the broken glass inside the light sticks. The liquid continued to glow. Kevin poured a ml or two into small test tubes. He gives 3 test tubes, red, green, and blue, to each group of three students along with 3 small pipettes. The students then combine various numbers of drops of each color in a small dimpled tray and fill out a sheet telling how many drops of each color formed which combined color. It's the old addition of lights lab done with light sticks. We each got a nice copy of the lab sheet.

We ended a very nice meeting with **Paul Dolan's** (Northwestern Illinois University) schedule announcement of the upcoming 2012-2013 ISPP meetings.

Thanks to Martha and all the Niles West crew for a great meeting! Be sure to join us at the Museum of Science and Industry on June 5.

Submitted by Pete Insley

Directions to MSI

From the north. Head south on Lake Shore Drive and turn right onto 57th Street. Get in the left lane and follow 57th Street around to the Museum's west side. Turn left to enter the Museum's underground garage.

From the south.

Via I-94: Take I-94 West to the Garfield Boulevard exit (exit 57). From the exit ramp, turn right and continue east on Garfield/55th for approximately one mile into the entrance of Washington Park. Bear right onto Morgan Drive for a half-mile, and bear right again onto Payne Drive for about a third of a mile, then turn left on Midway Plaisance. Continue east on Midway Plaisance for about a mile until it ends at Cornell Avenue, then turn left. You will see the Museum ahead on your right. Turn right at the 57th Street stoplight to enter our underground parking garage.

Via the Indiana Toll Road and Chicago Skyway: Exit the I-90 Chicago Skyway at Stony Island Avenue. Continue north on Stony Island for about a mile. As you approach E. 68th Street, move to the right two lanes so that you can bear right to follow Cornell Drive. Take Cornell Drive north about one mile, and turn right at the 57th Street stoplight to enter the parking garage.

From the west. Follow 290 East or 55 North to Lake Shore Drive. Go south on Lake Shore Drive. Exit right on 57th Drive. You'll need to be in the left-hand lane as you follow the curve around to the west side of the building and Cornell Drive. Turn left to enter the Museum's underground garage.

Park in the garage. Gates to be up when you leave, as last year.

Go up one flight of escalators and follow the signs (corridor to the right) to the Columbian Room.



Park in the garage. Gates to be up when you leave, as last year.

Go up one flight of escalators and follow the signs (corridor to the right) to the Columbian Room.