

Physics Tempo

The Newsletter of The St. Louis Area Physics Teachers
an affiliate of the American Association of Physics Teachers
March 1991 Vol. 1 No. 1

The Idea ...Physics Tempo

tem-po *tem-(pō) n. pl **tem-pl** \-(pē) or **tempo** [It. lit., time, fr *tempus*] (ca. 1724) 1: the rate of speed of a musical piece or passage indicated by one of a series of directions (as *largo*, *presto*, or *alleg*) and often by an exact metronome marking 2: rate of motion or activity: **PACE** 3: a turn to move in chess in relation to the number moves required to gain an objective

The American Heritage Dictionary of the English Language defines tempo as the relative speed at which a musical composition is played, or a characteristic rate or rhythm of any activity. I christened our newsletter *Physics Tempo* because I felt that it best described the demeanor of previous accomplishments and activities. The activities of the St. Louis Area Physics Teachers can be easily likened to a unending piece of fine music. There is a characteristic but variable rhythm in the organizational activities, having crescendos as well as quite passages. As the newsletter of St. Louis Area Physics Teachers, *Physics Tempo*, seems a descriptively appropriate name.

Mission Statement

Physics Tempo is the free monthly newsletter of and by the St. Louis Area Physics Teachers, an affiliate of the American Association of Physics Teachers (AAPT), and is intended as an organizational support group for the betterment of Physics and Physical Science teachers throughout St. Louis and Illinois.

Physics Tempo is dedicated to report achievements and announce the activities of the St. Louis Area Physics Teachers. In addition, *Physics Tempo* is intended to help disseminate useful and innovative information for teaching Physics and Physical Science. *Physics Tempo* is your newsletter. Editorial contributions are encouraged and welcomed. No idea is too small or insignificant. Send your articles, ideas, and subscription requests/address changes to: *Physics Tempo*: Editor / Paul Discher, Washington University-Electrical Engineering, Campus Box 1127, St. Louis, Missouri 63130-4899. FAX articles or Ideas to Washington University School of Engineering Fax Line: 314-726-4434. Please include the routing address shown above on FAX mail.

A brief History of our times:

It was Saturday September 29, 1990, 8:00am, and we had met at Webster University. Val Michael announced that our group, sometimes known as the Physics Alliance, will be formally known as the St. Louis Area Physics Teachers and would receive affiliation status with the AAPT in January 1991. After several years of informal gatherings, the St. Louis and Illinois Physics and Physical Science teachers, many of which I had come to know from the Woodrow Wilson programs, have finally officiated their own unique organization. It's only fitting in this premier newsletter that



**Woodrow Wilson Physics 1 Attendees
August 1987**

some tribute be made to the work and dedication that caused this group to form, and the hopes and aspirations we all have to make it continue.

Over the past 3 years, many people as well as organizations have played a role in facilitating the assembly of our teachers and encouraging it's continuance. My role entered with the Woodrow Wilson National Fellowship Foundation's Physics Outreach Programs. It seemed to me that this was the catalyst for the St. Louis Area Physics Teachers. This summer program was facilitated by my employer / host, the University of Missouri - St Louis, Dept of Physics and the Mathematics and Science Education Center, under the direction of Dr. Paul Markovits. The Woodrow Wilson National Fellowship Foundation orchestrated the funding, the concept, and trained the select Master Teachers. The workshops pursued conceptual and demonstrative Physics instruction, participant sharing, and endless motivations in teaching Physics. I was the site facilitator, host, and observer. The enthusiasm of the group brought me along later to become a participant and contributor as well.

The First Woodrow Wilson Physics One program was held August 2nd through 8th, 1987, at the University of Missouri - St. Louis campus. A reunion meeting of the '87 attendees and their guests followed months later, on Saturday February 20, 1988. The Physics One team Master Teachers were: Charles Windsor, Ames Senior High, Ames Iowa; George Smith, South Hadley High School, South Hadley, Mass; Thomas Gordon, Bronx High School, Bronx, NY; and Patrick Canan, Corvallis High School, Corvallis, OR. St. Louis represented the 5th site for these teachers in that Summer of 87. The style of our present gatherings still seem much the same. Many thanks to these teachers for

sharing with us their knowledge, experiences, a week of their summer, and the many months of thoughtful planning.

The Woodrow Wilson Physics Two Program meet at the St. Louis campus of the University of Missouri August, 1st through August 5th 1988. The Physics Two team Master Teachers were: Clarence Bakken, Palo Alto High School, Palo Alto, CA; Lorraine Maynard, Lenape Valley Regional High School, Stanhope, NJ; David Ohlde, Estes Park High School, Estes Park, CO; and Rex Rice, Mountain View High School, Mesa, AZ. The second Physics Outreach program brought back as many familiar faces as new ones. The style of our gatherings continued to be that of energy, enthusiasm, and dedication. Rex Rice returned in February 1989 to host the reunion, and returned again later that year to take a teaching position at Clayton Senior High School. He also married previous Woodrow Wilson II attendee and Physics Teacher, Deborah Burke (Roosevelt High School, St. Louis). (There seemed to be some "chemistry" occurring here....as well as Physics.)

The energy, enthusiasm, and dedication appears to go back further than the Woodrow Wilson Physics programs. It goes back several years before with the work of kinetic teachers like Val Michael and Bill Brinkhorst (Parkway Central), and David Lay (Parkway East). These and many other teachers, by their participation and contributions in the years before the Woodrow Wilson programs, laid the foundation for the St. Louis Area Physics Teachers. We greatly appreciate the ambition and dedication of all those participating and contributing teachers. Special thanks to Val Michael and Bill Brinkhorst. Their tireless work and interest in the past has helped to formulate our future.

This is the St. Louis Area Physics Teachers....why not join us?

The January 1991 Meeting

Date/Time: Saturday, January 26, 1991, 8:00am

Place: Washington University - Electrical Engineering
Host: Paul Discher

The monthly meeting of the St. Louis Area Physics Teachers was held for the purpose of electing new operating officers, prepare for the upcoming AAPT competition in April, and an instrumentation assembly/repair workshop. Rex and Debbie Rice were nominated and elected executive officers for the upcoming year. Paul Discher was elected to be your newsletter editor. Val Michael discussed the AAPT meeting at SIUE April 19, and 20. Invitations were solicited for entrants in our demonstration competition with the Chicago AAPT chapter. In addition, logistics were discussed for our visiting speaker Paul Hewitt as well as needed overnight accommodations for the visiting Chicago area teachers. Contributions were solicited from membership for the purpose of defraying the cost of Paul Hewitt's airfare. If you would like to contribute \$5.00 (or any amount) please contact Val Michael (Parkway Central 851-8220 Home: 394-6946). Washington University Professor of Physics, Dr. Pat Gibbons was a welcomed visitor, and he joined us as we adjourned

to the laboratories for the assembly/repair workshop. Facilities were provided for teachers to complete the assembly of apparatus purchased from Vernier Software in December. Small group consultations formed and addressed some specific problems teachers had with existing apparatus.

February 1991 Meeting was canceled

March 1991 Meeting

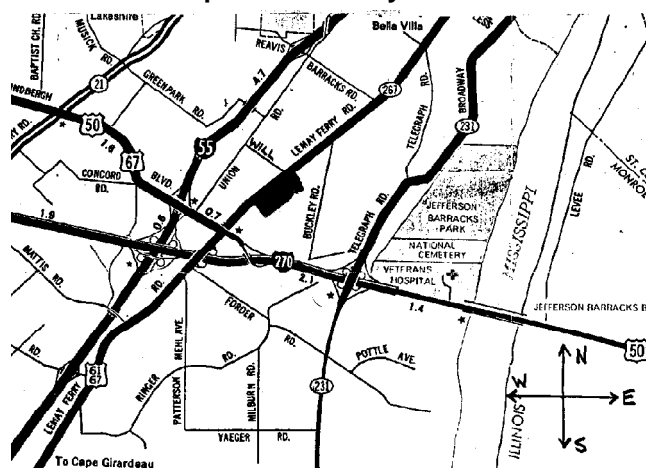
Date/Time: Saturday, March 16, 1991, 8:00am

Place: Mehlville Senior High School

Host: Gene Fuchs

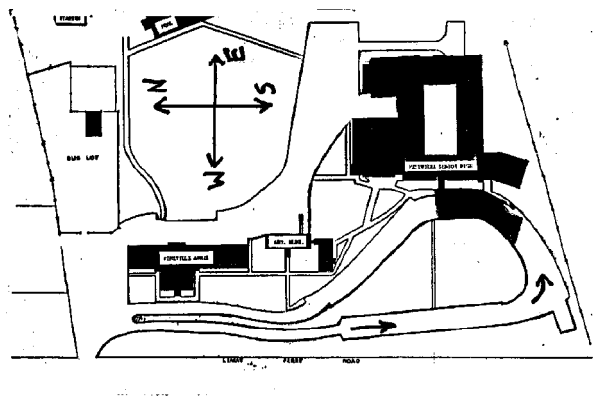
Gary Shepak and Gene Fuchs will be demonstrating experiments from Rutgers. Room directions via signs will be posted in the building. We all hope it won't snow again. Val Michael will be seeking volunteers to help to organize the agenda and logistics for the Demo Competition / AAPT section meeting April 19 and 20 at SIUE. Items still needing work include: accommodations for visiting Chicago Section teachers, funding, accommodations, and reception for Paul Hewitt's visit, and additional participants for the St. Louis section demo competition....any volunteers out there?

Map South County Area



The meeting will take place at Mehlville Senior High School, 3200 Lemay Ferry Road, room 202. Mehlville Senior High School is located in South County on the east side of Lemay Ferry Road about 1.5 miles north of South County Shopping Center.

Mehlville Senior High School Campus Map



Directions, for attendees coming from Illinois (South):

Cross the Jefferson Barracks Bridge via I-2-55 (west). Take the third (3rd) Missouri exit past the JB bridge, which is "Lindbergh Blvd. - Lemay Ferry Road" exit. Proceed on Lindbergh until you reach Lemay Ferry Road. Turn right onto Lemay Ferry Road, and proceed about 1- mile (second stoplight at Will Avenue) and then turn right, into the parking lot.

Directions, for attendees coming from Illinois (North):

Cross the Poplar Street Bridge, exiting to I-55 (south). Continue on I-55 south for about 15 minutes (at speed limit) exit at Reavis Barracks Road. Turn left onto Reavis Barracks Road continue to Lemay Ferry Road (3rd Light), turn right onto Lemay Ferry Road, continue to (Will Avenue), turn left into the parking lot.

Directions, for attendees coming from North & West County:

Take I-270 (South). The Lemay Ferry Road Exit is first exit after I-55. Take the Lemay Ferry Road Exit Turning right onto Lemay Ferry Road. Follow Lemay Ferry Road (4- stop lights) turn right onto the driveway to the parking lot.

Campus Directions:

Enter the second door (with steps and canopy). Follow signs to room 202. For questions, contact Gene Fuchs, Mehlville Senior High 314-892-5000 at home 314-631-4682.

Lenz's Law

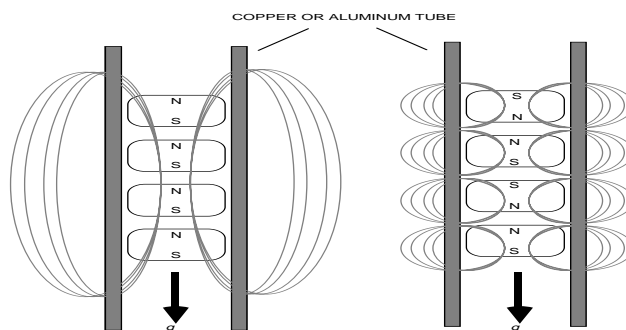
During our September 1990 meeting, (Webster College) Bill McConnell demonstrated an item that was purveyed as a classroom novelty item. It consisted of a cylindrical magnet that was dropped through an aluminum or copper pipe and by some mystical reason the magnet took much longer than it should have in falling through the pipe. The December newsletter also featured some sources for obtaining similar items. I had some more ideas on this subject, the demonstration of Lenz's law

The phenomena, known as Lenz's law, is simply explained. When a magnet falls down a copper or aluminum tube, the magnet's field induces an electric current around the tube, as well as an opposing magnetic field. The opposing magnetic field causes the magnet to fall more slowly than it normally would if it was under the exclusive influence of gravitational acceleration. Pasco Scientific sells similar apparatus for \$48.00, but you can produce a Lenz's Law demonstrator for much less and quite easily.

To begin construction, you need to search for a good cylindrical magnet. A good magnet for this type of experiment is sometimes hard to find. However the best kind is called a "cow magnet" and can be obtained from feed & grain or farm supply houses. "Cow magnets" were originally intended to be forced down the throat of grazing cattle. Once in their stomach, the magnet would collect foreign and harmful

magnetic metal objects that the cow may have accidentally ingested. The inert magnet and its "attachlings" are harmlessly released through the cow's digestive tract. Using "Cow Magnets" for Lenz's Law demonstrations is certainly far more interesting and not nearly as messy. Similar powerful cylindrical magnets can be obtained from Reliance Co. 199 Freshwater Road, Enfield, CT. 06082 (1-800-243-5344). Magnets cost about \$4.00, and copper or aluminum tubing can be purchased from local hardware stores for \$.60 to \$1.00 per foot.

The phenomena predicted and demonstrated by Lenz's law, can vary with equipment, and is caused by the amount of electrical current, and strength of the opposing magnetic field generated in the tube. If these factors could be increased, a slower falling magnet would more profoundly and dramatically illustrate Lenz's Law. One method for attaining this improvement can be achieved by choosing a stronger magnet that usually costs much more or becomes more difficult to find. There is a way to improve the Lenz's Law effect without stronger magnets. This is done by using multiple magnets in a somewhat unusual arrangement. This method seeks to increase field intersections using a stack of disc magnets arranged end to end with opposing poles. The net result is a still much slower falling magnet assembly without the expense of a more powerful magnet.

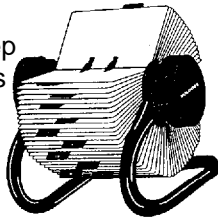


I experimented with ordinary cylindrical magnets and compared their progress through a 1-meter length of copper pipe with that of a stack through a 1-meter length of copper pipe with that of a stack through a 1-meter length of copper pipe. Much to my surprise, the disc stack took significantly longer to glide through the tube than ordinary cylindrical magnets. It is very important that you construct the disc stack correctly. Make certain that you stack like poles together. This might seem difficult because the magnets repel one another while you are trying to make a stack. Simply use a thin covering of Scotch tape to hold the magnets while you form a "cylindrical stack". I used an arrangement of about 8 each, 1/2" button magnets that I obtained from Radio Shack (part #64 1880) for about 21¢ each. This arrangement appears to increase the number of field intersections made by the magnet on the molecules of the non-ferrous tube. The net result is a much stronger electrical current and subsequent magnetic field.

Special acknowledgement to, the PIRA newsletter and Bob Devantery, Winnacunnet High School, Alumni Drive, Hampton, NH 03842

The Physics Teacher's Rolodex

As you know the rolodex is where you keep you names and addresses handy. This column of the newsletter will be dedicated to listing sources for useful Physics teaching equipment and services.



BULBTRONICS INC
45 BANIF PLAZA
FARMINGDALE, NY. 11735
516-249-2772

These folks carry all sorts of light bulbs as you might gather from their name. Good source for hard to find bulbs.

LEE SPRING COMPANY
7400 W FRIENDLY AVE
GREENSBORO, NC. 27410
919-292-0856

These folks make all sorts of springs. Write them and request the 'Spring Engineering Guide' for more than you will ever want to know about springs.

IASCO INDUSTRIAL ARTS SUP.
5724 WEST 36TH STREET
MINNEAPOLIS, MN. 55416-2594
612-920-7393

Source for useful materials like, PLASTIC, WOOD, FIBERGLAS, and METAL, also TECH BOOKS ON METAL & PLASTIC forming and project kits.

GRAPHIC CENTER
3755 TRANSPORT ST. / BOX 818
VENTURA, CA. 93002
1-800-336-6096

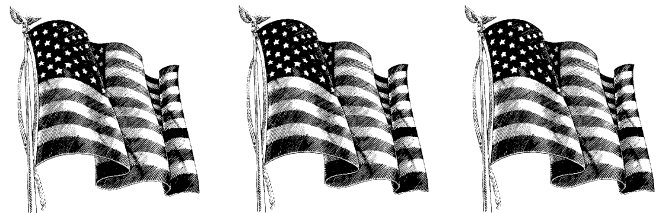
These folks moved in where Polaroid left off, they sell and repair all sorts of Polaroid (used) cameras going back to the old type pack film and the original J66 Land Camera. If you still use Polaroid cameras and film you will want their catalog.

Electroscopes and installing “#?&@()*%~!%” gold leaves!

I have had the displeasure of trying to install new gold leaves on CENCO electroscopes. The gold leaf pad that I had received was improperly cut, and all of the leaves stuck together. Needless to say, I got no gold leaves on the electroscope.

After several experiments with alternate materials I found a substitute material that seems to work. I substituted a strip of 1/8" mylar audio (cassette) recording tape for the gold leaf. I attached it to the center post of the electroscope with rubber cement. Not only is this method functional and inexpensive, you will dare never need to replace it again!

In memory of Americans Fighting for Freedom



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