



American Association of Physics Teachers

AAPT Ontario Section

NEWSLETTER

Vol. X No. 1

Ontario Section Annual June Meeting

The ninth annual June meeting of the Ontario Section of the AAPT was held in Sudbury, Ontario, from Sunday, June 21 to Tuesday, June 23, 1987. The meeting was co-hosted by Laurentian University and Science North, the unique science center in Sudbury. Approximately 65 members were treated to a well organized and rewarding meeting, filled with a variety of stimulating events.

Several people began the meeting on Sunday with a guided tour of some of the facilities of the International Nickel Company (INCO). The tour combined concepts from physics, chemistry, geology, and technology in a way that helped us appreciate the complexity of such a large operation. The first day ended with a reception at Science North and an hour-long cruise on Lake Ramsey.

On Monday, the first full day of the meeting, Dr. Daniel, President of Laurentian University, and Dr. Goldsack, Dean of Science, officially welcomed the participants. Dr. Goldsack emphasized how physics research is an important factor in trying to improve productivity in mining.

Tom Semadeni, Director of Science North, presented a brief history of the science center, including descriptions of how the center was constructed to suit the geological setting, and how the exhibits continually evolve. The underlying philosophy of Science North is to have visitor participation in the "action of science". Anyone older than 40 years is warned to be careful when taking the fitness test.

George Vanderkuur, chief scientist at the Ontario Science Center in Toronto, gave an exciting talk titled "Physics as Art" which included numerous demonstrations covering a variety of topics such as light, mechanics, music, and art.

Dr. Peter Hinrichsen, who teaches in Quebec and is an avid sailor in his spare time, presented a talk on the "Physics of Sports". He applied physics principles to the analysis of the trajectory of a golf ball and the measurement of the weight distribution of sailing boats.

Dr. Brian Kaye, a physics professor at Laurentian U., presented a paper on "A Random Walk Through Fractal Dimensions" in which he illustrated the nature of random walk statistics, Brownian motion, fractals, and the use of computers to draw fractals.

The day sessions ended with the following short presentations:

- Alan Nursall: "A Closer Look at the Superstack"
- Gerald Guzzo: "Run Like a Horse"
- Tom Patitsas: "Size Determination of Asbestos Fibers"
- John Wylie: "The International Physics Olympiad"

A wine-and-cheese reception and the annual banquet were held Monday evening at the Science North Cafeteria which overlooks Lake Ramsey. Then Bjarni Tryggvason, a Canadian astronaut, gave an informative talk on "Physics in Space" in which he discussed proposed plans for a manned space station which would be approximately 3% Canadian and the remainder American, European, and Japanese.

On Tuesday, Dr. Doug Hallman, assistant professor of physics at Laurentian U., brought us up to date on the developments of the Sudbury Neutrino Observatory to be built deep in the Creighton Mine where background radiation is very low. The neutrino detector will be unique in its use of heavy water in the core, surrounded by ordinary water.

David McKay, currently the Science Projects Utilization Officer with TVOntario, presented a visually pleasing workshop on the use of videos in the physics classroom. He related the new science curriculum guidelines to video materials available both now and in the future.

Finally, a talk by Gilles Gaudet called "Microwaves, Particles, and Photons" was followed by the popular "Favorite Demonstrations" session which included:

- Peter Levan: "Efficiency of Mousetrapmobiles"
- Al Hirsch: "Nitinol and the Amazing Icemobile"
- Don Bosomworth: "Internal Reflection of Laser Light"
- Peter Hinrichsen: "A Bistable Cartesian Diver, An Inexpensive Audio Source, and A Plumbing Fixture Resonance Tube"

The meeting also featured displays by scientific supply companies and book publishers, and the usual friendly atmosphere.

Congratulations to Peter Levan and the members of his conference committee who organized a superb meeting. The next annual meeting will be held at the Scarborough Campus of the University of Toronto in June, 1988.

AAPT/APS Winter Meeting, 1987

The 1987 AAPT/APS Joint Winter Meeting was held in San Francisco, California, from January 28 to January 31. You will recognize the names of some or all of the following people who attended.

- Doug Fox (Windsor) gave two presentations and received a Distinguished Service Citation.
- Don Ivey (Toronto) presided over a session.
- N. Gauthier (Kingston) gave two presentations.
- P. F. Hinrichsen (Quebec) gave a presentation.
- Dean Gaily (on leave from the University of Western Ontario) was involved in two presentations.

- Ernie McFarland and Stuart Quick were seen dashing from one session to another.

Following is a list of the meeting highlights.

1. There were workshops on:
 - Interactive Videodisc Lessons Development
 - Producing and Using Videotapes in Physics Curricula
 - Apple Assembly Language and Animation
 - Teaching and Learning Physics with Personal Productivity Software
2. There were demonstration sessions and the annual "Physics Show" of apparatus and publications.
3. Plenary sessions included:
 - Particles and Fields
 - Fractals in Physics
 - Frontiers in Astronomy
4. There were several symposia, including:
 - Women in Astronomy
 - Computers as Teaching Tools
 - Museums and Science Centres
 - Big Telescopes
 - Research at Small Institutions
 - Science Fiction
 - The Physics Olympiad
 - Report on the Far East Physics Conference
5. A panel discussion titled "The Current Status of Physics and Society Courses" concluded that such courses should be available for non-science majors, but societal implications should be integrated into all regular physics courses as well.
6. A popular symposium on "First Year College Physics Texts" revealed excellent arguments for including the use of computers and the study of modern physics in physics courses. However, the most positive audience response was given when one panel member called for a "back to the basics" approach to a broad range of topics, such as surface tension, colour, music, and fluids in motion.
7. We visited the Exploratorium, which is San Francisco's "hands-on" science centre. Although the visit was very interesting, I came away proud of our science centres in Toronto and Sudbury.
8. The multi-course banquet in Chinatown on the Friday evening was a resounding success. It was followed by an exciting and entertaining presentation on the physics of ballet dancing by Dr. Kenneth Laws of Dickenson College. As a ballet dancer from San Francisco demonstrated a variety of manoeuvres, Dr. Laws explained the physics involved, sometimes becoming entangled in the microphone cord as he augmented the dancer's spinning with examples of his own. (Dr. Laws has written a book titled The Physics of Dance, published by Schirmer Books, a division of MacMillan Inc., N.Y.)

On a more personal note, the most topical session I attended was one on earthquakes. (Yes, there was a minor tremor reported in San Francisco during the conference!) I attended committee meetings of the AAPT Council and Section Representatives, as well as the High School Committee. I also met various physics teachers from Michigan and Ohio who expressed interest in having a joint meeting in Windsor, Ontario, in a few years. (If this does occur, the first possible date would be June, 1989.) Finally, I learned that the "Canadian connection" is increasing, with Alberta being the newest section to join the AAPT. (Ontario and B.C. are the other provinces, with Quebec considering joining as well.)

The summer meeting of the AAPT was held in June in Bozeman, Montana, and the next Joint Winter Meeting of AAPT/APS will be held in Washington, D.C., in January, 1988.

Alan Hirsch, Section Representative

Selections from the SCIENCE CORNER.

Volume 6 of "SELECTIONS from the SCIENCE CORNER" is now available by writing to:

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(A cost-recovery donation of \$3.00 would be greatly appreciated.)

AN ASTRONOMER once remarked to Bishop Fulton J. Sheen:

"To an astronomer, man is nothing but an infinitesimal dot in an infinite universe."

"An interesting point of view," remarked the bishop, "but you seem to forget that your infinitesimal dot of a man is still the astronomer."

- *The Wit and Wisdom of Bishop Fulton J. Sheen*
(Prentice-Hall)

Just remember

فیزیک خوبه !!!

AAPT-Ontario
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1987-88

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THE DEMONSTRATION CORNER

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This marks the first appearance of this column, which has been prompted by the great popularity of the demonstration sessions at our annual conference. Submissions describing demonstrations will be gladly received by the editor.

This first column is adapted from an article in the *Guelph Daily Mercury*, by Jim Hunt of Guelph's Physics Dept.

The Bistable Diver

A fun toy which teaches a lot about hydrostatics and Archimedes' principle can be made from some very simple items. You will need 1) a large transparent dishwashing detergent plastic bottle (see A in Fig.) with a plastic valve cap, and most importantly, with an oval cross section; 2) a cap from a ball point pen; 3) a few small paper clips.

First thoroughly clean the detergent from the bottle and valve and fill the bottle with water to within 2-3 cm of the top (B in Fig.).

Drill a small hole in the pocket clip of the pen cap and hang a paper clip in the hole (C in Fig.). Put this "diver" in a pot of water; with one clip the diver will float easily. The job is now to hang additional paper clips on the first one until the diver just barely does not sink. You might have to trim a bit off the last clip with wire cutters. The model tested for this project required in total two 3-cm clips and three 2-cm clips.

The "just floating" diver should be carefully floated in the water in the bottle, the cap replaced, and the valve closed.

If you now squeeze the bottle gently in its narrowest direction, the trapped air in the diver will be compressed and the diver will sink. Release the pressure and the diver will rise. You have now constructed a standard "Cartesian Diver", which is interesting enough in itself.

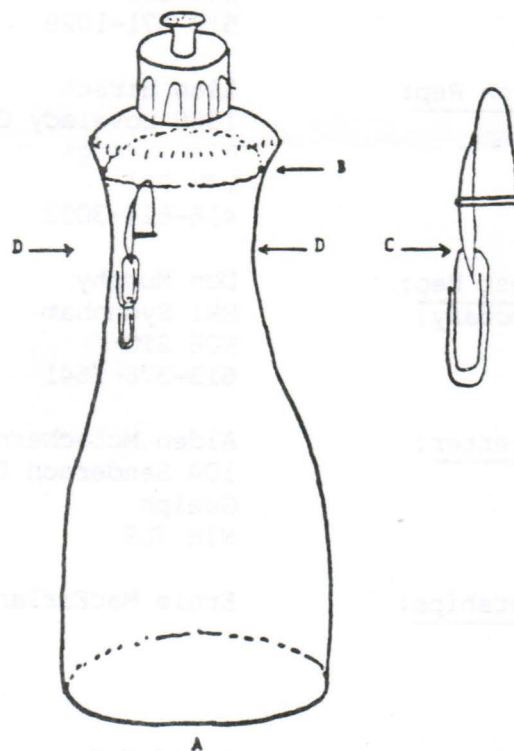
However, we want to go further. Open the valve and put your mouth over the cap and blow — the diver sinks. Now comes the tricky part — with your mouth over the cap and the diver sunk by blowing, close the valve either with your tongue or with a finger also inserted in your mouth and sealed with your lips (we said it was tricky!) The diver now stays on the bottom instead of the top.

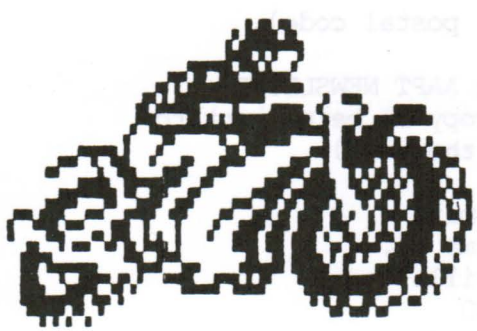
Here comes the surprise — gently squeeze the bottle at the wide part of the "waist" (D in Fig.) and the diver will rise! If it does not rise, you blew too hard originally and will have to try again. With a bit of fiddling around with your initial blowing pressure, you should be able to arrive at a situation in which the diver will rise from the bottom with a squeeze at the wide part of the "waist", and will sink from the top with a squeeze in the narrow direction.

The valve always leaks somewhat and the pressure will have to be adjusted periodically. You can make a more permanent arrangement with a stopcock replacing the original valve.

HOW IT WORKS — When the diver is floating at the top, squeezing the bottle in the narrow direction compresses the air trapped in the diver, the buoyancy is reduced and the diver sinks. At the bottom of the bottle the hydrostatic pressure of the water is enough to keep the air in the diver compressed so it cannot rise. But the surprising thing about these particular bottles is that squeezing them in their wide dimensions does not decrease their internal volume, but increases it. Thus, with the diver at the bottom, a squeeze at D decreases the pressure in the bottle and causes the air inside the diver to expand with the result that the diver floats to the top.

Another demonstration which involves bottle-squeezing requires a small glass liquor bottle (a "mickey"), topped by a tight-fitting holed stopper with a fine capillary tube inserted in the hole. Squeezing the bottle in its narrow direction causes liquid to flow up the tube; squeezing in the wide direction causes liquid to flow down the tube. Students are often surprised to learn that a solid such as glass is deformable.





d = at ²

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No Match for It

SCIENCE is a match that man has just got alight. He thought he was in a room - in moments of devotion, a temple - and that his light would be reflected from and display walls inscribed with wonderful secrets and pillars carved with philosophical systems wrought into harmony. It is a curious sensation, now that the preliminary sputter is over and the flame burns up clear, to see his hands lit and just a glimpse of himself and the patch he stands on visible, and around him, in place of all that human comfort and beauty he anticipated - darkness still.

- H. G. Wells