Ontario Association of Physics Teachers

NEWSLETTER

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June Conference Report

by : Alan Hirsch
Section Representative

The twelfth annual conference of the Ontario Association of Physics Teachers was held at the University of Windsor from Sunday, June 17, to Tuesday, June 19, 1990. Although the number of registrants at the conference was a relatively small 65, the comraderie and stimulation were grand.

The conference began with a demonstration workshop on "Teaching Physics through Electronics" presented by Dr. Edwin Karlow of Loma Linda University, California. Dr. Karlow began by demonstrating several aspects of the operation of an oscilloscope. Then he used the oscilloscope and various other devices to demonstrate topics in sound, electricity, and magnetism. The electronic equipment as well as the demonstrations ranged from simple to complex.

A Sunday evening reception was held in a lounge on the top floor of Electa Hall overlooking the Detroit River and providing a panoramic view of the lights of Detroit.

Monday was perhaps the busiest day in the history of our June conferences. After a brief welcome by Dr. Gordon Wood, Vice President, Academic, of the University of Windsor, we watched Frank Allen of the Ottawa Board of Education present numerous physics demonstrations, many of which utilized toys and other inexpensive, everyday apparatus. Frank also described activity centres that promoted cooperative learning.

During the coffee break, the line-up to view the sun through each of two telescopes set up for that purpose was longer than the line-ups for coffee or the displays of books and equipment so kindly set up by publishers and scientific supply companies.

The morning concluded with the following presentations:

Darcy Dingle : "Teaching Spacial Thinking through Naked-Eye Astronomy"
William Baylis : "Why i"
Andrew Blaber : "Rocketry by Computer"

The afternoon began with a demonstration workshop of The New SUPERCHAMP Interface by a representative from Merlan Scientific. This was followed by a lively presentation on the newest rage in Ontario, "Amusement Park Physics." The main part of the presentation was given by Carole Escobar from Brooklyn, New York, who has taken students for several years on trips to amusement parks. We also had a brief introduction to the Physics Day at Canada's Wonderland (located just north of Toronto) given by Nancy Grant, who is in charge of this growing event. (On May 29, 1990, Canada's Wonderland held its first annual Physics/Science Day. It was attended by about 1300 students. I predict that next year's event will be enjoyed by at least 6000 students.)

During the amusement park presentations, everyone began assembling their vertical and horizontal accelerometers, which were manufactured by Pasco Scientific and donated by Merlan Scientific. We carried the accelerometers onto waiting buses, and some teachers were seen testing their accelerometers as the buses transported us toward Windsor's amusement park on Boblo Island. After an enjoyable meal, we took a ferry to the island. Most participants verified that experiencing acceleration and forces on amusement park rides helps make physics understandable, exciting, and fun. Although our time on Boblo Island was short, it was a most enjoyable excursion.

The Tuesday sessions began with an up-to-date and stimulating talk on "Fibre Optics" by Jack Dyment from Bell Northern Research, Ottawa. He described how glass fibres are manufactured and assembled into cables, and how lasers provide multiple signals through digitized coding. He also gave an overview of the social and economic implications of the use of fibre optics in communications.

George Kelly from Guelph presented a report on the OAPT physics prize contest which was written by about 2500 students in May. This is George's third and final year as contest chairperson. We sincerely thank him for all his hard work and support.

Ernie McFarland from the University of Guelph presented a paper titled "Common Student Misconceptions in Introductory Physics." Pretesting and posttesting students in first year university reveal that large numbers of students have misconceptions about

basic physics principles. Ernie described four examples from mechanics and suggested ways of reducing the problem.

The afternoon included these presentations:

John Wylie : Report on the "Canadian Physics Olympiad"

Petrusia Kowalski : An independent study unit on "Machines and Gadgets"

Malcolm Coutts : "Topics for Independent Study in OAC"

Frank DiPietro : Demonstration of the computer software "Interactive Physics"

John Braun : "War Games Lab" using springs

For those who were able to stay, two tours were available, one to a Ford Motor Company plant and the other to the imaging department of a hospital.

All who attended the conference agreed they were happy they had done so. Thanks to Nigel Hedgecock and Bill Konrad for a successful conference.

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Send to: Professor Ernie McFarland,
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June Conference, 1991

The annual OAPT conference will be held at Queens University in Kingston from Sunday, June 23 to Tuesday, June 25. Mark your calendar now and plan to attend.

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Member-at-Large:
This position is currently unfilled. Ideally, it should be someone who can provide liason with the CAAT's. If you are interested or have any suggestions, please contact any member of the executive.

Laser Workshop

In the September, 1989 issue of this newsletter, Bill Konrad wrote an article about a summer workshop in laser and lightwave sciences held at the University of Toronto. This worthwhile endeavor was offered once again in 1990 for a week during the month of August. There were lectures on the theory of lasers, holography, environmental monitoring, chemical applications, medical applications and the impact on society. Tours were taken to research laboratories, a holographic art gallery and a laser machining centre. Laboratory activities were also provided.

This workshop will be offered once again in the summer of 1991. For further information, write to

Summer workshop co-ordinator,
Ontario Laser and Lightwave Research Centre
McLennan Physical Laboritories,
60 St. George St., Suite 331,
Toronto, Ontario
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Amusement Park Physics

Amusement park physics was the major theme of the June conference. Those of us who were foolhardy enough to make the trip to Boblo Island, survived a few of the rides with our accelerometers. (If your accelerometer reads less than one "g", don't look down, you are probably upside down.) The October, 1990 issue of The Physics Teacher carries an article **Amusement Park Physics** by Carole Escobar, who was a speaker at our conference. You may also wish to look up the article **Physics In Wonderland** by Eli Honig in the centennial issue of the Crucible, February, 1990. More than 1000 students visited Canada's Wonderland on a science day in May of this year and the event will be repeated in 1991. Information will be mailed to the schools by Canada's Wonderland.

MAKING SOUND WAVES VISIBLE

by
Bill Konrad
Kent County Board of Education

The demonstration described below was demonstrated at the OAPT conference in London in June 1989. Since there was a fair bit of interest in the details of construction of the apparatus, I thought this column would provide a convenient opportunity to give the specifications. Essentially, a speaker at one end of the closed air column is used to set up a standing wave of sound inside the column. Natural gas enters the device through two copper tubes. The gas is lit and burns at numerous holes drilled across the top of the duct. Due to differences in pressure at the nodes and loops of the standing wave inside the air column, the flames that are generated vary in height giving a visual outline of the wave inside.

The device can be constructed using round heating ducts which can be purchased from a heating contractor, a hardware store, or from Canadian Tire Ltd. If the ducts are flat sheets of metal when purchased, they must be assembled. It is also a good idea to solder all seams so that they become air tight. A metal plate, also made of sheet metal, is soldered at one end. A wooden frame is constructed for the other end. Simply cut two pieces of plywood that are the same size as the metal plate that is soldered to the one end. Cut a circular hole equal in diameter to the heating duct in the middle of each of these two wooden pieces. Mount the speaker (5″) to one of these pieces. Insert a piece of flexible rubber (available as rubber dam from Boreal Scientific Ltd.) between the two pieces of wood. Bolt the two pieces of wood together using a carriage bolt in each of the four corners. Now slide this assembly over the remaining open end of the duct. Use caulking to seal the space between the wooden frame and the duct and to attach the duct to the wood.

Drill holes in the top of the duct so that they are spaced about 1/2″ or 1 cm apart. In the model I constructed, these holes are quite small (3/32″). A piece of copper tubing must be inserted and soldered in place at each of two locations on the duct so that natural gas can be forced into the device.

To operate this demonstration, simply turn on the gas and then light the gas escaping from the numerous holes across the top. Once all the air has been expelled from the duct, the flames will be yellow in colour. Now switch on the signal generator and amplifier that power the speaker. At low frequencies (below 100 Hz), the flames can be seen to vibrate at the audio rate. If the volume is turned up, the flames begin vibrating so vigorously that they are easily blown out. For the model I constructed, resonance could readily be demonstrated between 200 and 300 Hz. Carefully adjust the frequency until the numerous flames of various heights trace out a sine wave. Measurements of wavelength can then be made directly from the flames. (Remember that this is the wavelength of sound in natural gas.) As the frequency is changed, the wavelength of the sound can be seen to change as well.

Some students have told me that this is their favourite demonstration in physics. When performed in a darkened room, it is impressive!

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Submissions describing demonstrations will be gladly received by the column editor.