



NEWSLETTER

Volume XIV, Number 1
October, 1991

June Conference Report

Alan Hirsch and Malcolm Coutts

Sunny, temperate weather greeted some eighty delegates to the thirteenth annual conference of the Ontario Association of Physics Teachers at Queen's University on Sunday, June 23, 1991. As usual, the format of this three day conference allowed plenty of time for mingling, socialization and informal conversations.

The proceedings began with an afternoon workshop on computerized test construction presented by Patrick Whippey of the University of Western Ontario. Dr. Whippey has developed a "test engine" for storing test questions and assembling tests in the environment of Word Perfect 5.1. The participants spent their time at the computer keyboard retrieving questions from the test bank and putting together a test.

A Sunday evening reception at the Queen's Faculty Club gave us an opportunity to renew old acquaintances.

Following words of welcome from Don Taylor, Head of the Physics Department at Queen's University, Monday's program began with a fascinating talk by Reginald Smith of Queen's University and the Canadian Space Agency. Dr. Smith does materials research and is particularly interested in phase transitions which take place in the absence of convection in a weightless environment. A high quality environment of 10^{-6} g can be maintained for a few seconds in a drop tube. Much longer time periods can be obtained by using rockets or a space shuttle but the cost rises dramatically and the quality of the environment is not always so high.

Andrew Blaber reported on the Canadian entry in the 1992 Space Sail Cup, an international race to Mars using a solar sail propulsion system. The design theory involves photon momentum and orbital mechanics. Formidable practical problems will be encountered in deploying an aluminized kapton sail 8 μ m thick and several hundred square metres in area.

Bill Collins, representing Telecommunications Research In Ontario, showed an "upbeat" video designed to encourage young people to pursue the study of mathematics and science. Schools will be notified when the final version of the video is available.

The afternoon session featured two talks dealing with polymer physics. Marsha Singh of Queen's University, spoke about phase transitions in co-polymers. She showed that a very large scale lattice-like ordering may occur. Jim Stevens of Guelph University spoke about his research on "smart windows", electrochromic devices which change their reflectivity at various wavelengths in response to a stimulus such as temperature.

Peter Scovil and Malcolm Coutts reported that 2300 students from 185 schools took part in the OAPT Contest. Some schools have requested an earlier reporting of the results and the committee is considering sending out test answers immediately following the day of the contest.

Peter Scovil distributed copies of an independent study for OAC physics students dealing with operation and applications of an oscilloscope. Bill Tallman presented some more of his imaginative ideas for motivating students by using objects from everyday life.

(continued)

Glen Main showed two clips from videos designed to teach physics through real physical events. These are available from Physics Curriculum and Instruction in Bloomington MN. David McLay outlined the Queen's University Summer Program for Science Teachers and showed slides of some typical activities. The theme for the 1992 program will be Energy and the Environment.

The dinner cruise through The Thousand Islands provided further fellowship and an opportunity to view the conjunction of Jupiter, Mars and Venus.

Tuesday's sessions began with a presentation on International Perspectives of Physics Education by Michael Matthews of the Toronto French School. Having taught physics in various European countries before coming to Canada, Michael is well qualified to judge how Canadian physics education compares internationally. The media might have us believe differently when it emphasizes that Canada placed 11th out of 13 countries on an international science exam for 17-year olds, whereas Hong Kong placed first. What should be added is that in a similar test given to 14-year olds, Canada placed 4th out of 17 countries and Hong Kong placed 16th. The apparent discrepancy stems from the fact that Canada keeps a far higher proportion of students in high school than Hong Kong or most other countries.

The second invited speaker, Allan Brown of Queen's University, discussed the philosophy and organization of the International Baccalaureate program. This program emphasizes education of the "whole" person in its offering of senior high school courses. In Canada, there are 41 schools (mostly private) that offer this international program.

John Wylie of the Toronto French School brought us up-to-date on the International Physics Olympiad. Canada's team, chosen after many challenging steps, represented our country very well in the 1990 competition. This year's event is hosted by Cuba.

The remainder of the conference was spent with contributed papers. Patricia Hughey from Lansing College in Michigan talked about Conceptual trees in Physical Science. This method of classifying vocabulary helps both students and teachers gain a more complete perspective of course material. Ross Getsinger from Oakville Trafalgar School demonstrated several examples of marble launchers built by his senior students, and he described how the project was integrated into the physics course. Jeff Culbert of the University of Western Ontario discussed alternatives to traditional problem solving techniques. Sharad Tembe of Uxbridge Secondary School shared several well organized ideas on independent study projects in his senior physics course.

Three teachers who are currently working at the Ontario Science Centre also gave presentations. Bill Prior demonstrated how to prove that a soap film adopts a configuration that has minimum energy. David Kroecker demonstrated a home-made hovercraft big enough to carry a person. This "human air-puck" is powered by a small shop-Vac, and can be seen at the Science centre. John Caranci described the exciting senior level (OAC) courses offered at the Science Centre.

Many thanks are due to John Wylie of the Toronto French School and David McLay of Queen's University for their dedication and hard work in organizing and hosting this year's stimulating conference.

Bill Konrad Stays On

We are pleased to announce that Bill Konrad has accepted the position of section representative for the OAPT and will act as our liaison with the AAPT. Having served as president and having helped in the organization of two OAPT conferences, Bill is well qualified to represent us.

The **OAPT newsletter** is published four times a year by the Ontario Section of the American Association of Physics Teachers.

<i>President:</i> Nigel Hedgecock, University of Windsor, Windsor, Ontario, N4B 3P4.	<i>Newsletter Editor:</i> Malcolm Coutts, 6 Swanwick Ave. Toronto, Ontario, M4E 1Z1.
--	--

Membership Due?

The date on your address label is the expiry date for your membership. If it says June 91, your membership has already expired. You may use the coupon below to renew it.

Membership Application or Renewal

Name _____

Address _____

\$8.00 per year, payable to the OAPT

Send to : Ernie McFarland,
Department of Physics,
University of Guelph,
Guelph, Ontario,
N1G 2W1.

Section Officers 1991/92

President:
Nigel Hedgecock,
Department of Physics,
University of Windsor,
Windsor, ON, N9B 3P4.

Vice-President and Conference Organizer:
Fred Hainsworth,
Department of Mathematics,
Physics & Computer Science,
Ryerson Polytechnical Inst.,
350 Victoria St.,
Toronto, ON M5B 2K3.

Secretary-Treasurer:
John Wylie,
The Toronto French School,
306 Lawrence Ave. E.,
Toronto, ON M4N 1T7.

Section Representative:
Bill Konrad,
RR #1, Site 4, Box 1,
Wheatly, ON M4N 1T7.

Member at Large (interim):
Alan Hirsch,
2199 Parker Drive,
Mississauga, ON L5B 1W3.

Newsletter Editor:
Malcolm Coutts,
6 Swanwick Ave.,
Toronto, ON M4E 1Z1.

Memberships:
Ernie McFarland,
Department of Physics,
University of Guelph,
Guelph, ON N1G 2W1.

Prize Exam Co-ordinator:
Peter Scovil,
P.O. Box 1169,
Waterford, ON N0E 1Y0

The next OAPT conference will be held at Ryerson Polytechnical Institute, Toronto, June 28 - 30, 1992. Plan to be there.

THE DEMONSTRATION CORNER

VIRTUAL IMAGE FORMED BY A PLANE MIRROR

by

T.J. Elgin Wolfe

Faculty of Education
University of Toronto
371 Bloor St. W.
Toronto, ON M5S 2R7

An interesting demonstration that makes use of the location of the virtual image formed by a plane mirror can be done with a black cloth, a small candle (about 2 cm in height), a dull dark opaque shield about 3.5 cm tall and bent at right angles, a large pane of thin window glass, two retort stands, 4 adjustable clamps, a 400 mL beaker, and coloured water. To highlight the beaker in the dim light, outline the outer edges (as viewed by the class) with masking tape.

Set up the apparatus as shown in the diagram (top view). Place it on top of the dark, non-reflective cloth before the class arrives. Make the room as dark as possible by closing the drapes, and cover the apparatus with a blanket or sheet.

Have the students close their eyes and rest their heads on the desk. Turn off the overhead lights and light the candle. Mask the candle and its flame from the class using the bent shield. When the students lift their heads and look, a candle will appear to be burning inside a beaker. The mask will obscure the real candle from view.

Ask students to suggest ways to "extinguish" the candle without blowing on it. They will propose covering the beaker with a glass plate, or pouring water into the beaker. Pour coloured water into the beaker until the water covers the "flame." Ask students to explain why the candle remains lit.

Have students close their eyes and rest their heads on the desk while you extinguish the real candle and cover the apparatus with a sheet. Divide the class into pairs and challenge each pair to draw a sketch to explain the discrepant event. Discuss their ideas and introduce the term virtual image.

Column Editor: Ernie McFarland, Physics Dept.,
University of Guelph, Guelph, Ontario, N1G 2W1

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

