NEWSLETTER

ONTARIO ASSOCIATION OF PHYSICS TEACHERS
(an affiliate of the American Association of Physics Teachers)
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AAPT Winter Meeting Report

Kissimmee, Florida January, 2000

by Diana Hall (diana_hall@ocdsb.edu.on.ca)

This year's AAPT winter meeting provided a welcome opportunity to escape the extreme temperatures of Ontario. The traditional first two days of workshops provided lots of fun and entertainment. I attended one at the Theme Park and two on the Physics of Magic.

At Universal Studio's Islands of Adventures we were given a behind the scenes tour of a roller coaster called "The Hulk." We saw the amazing generators which are used to power the ride and learned about the unique mechanism used to shoot the cars up the initial incline. Afterwards Vernier equipped us with CBLs and accelerometers and sent us off to collect data. I'm not an experienced rider but I did get up the courage for the Hulk and learned a very important lesson about the CBLs. "You have to push the button hard to start the data collection." Oh well, others actually got some.

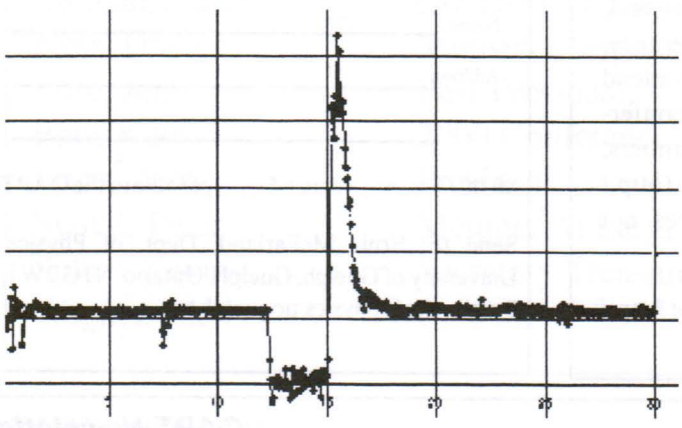
The graphs at the bottom of the page are examples of the type of data obtainable with the Vernier accelerometers and CBLs. Both are vertical tower type rides.

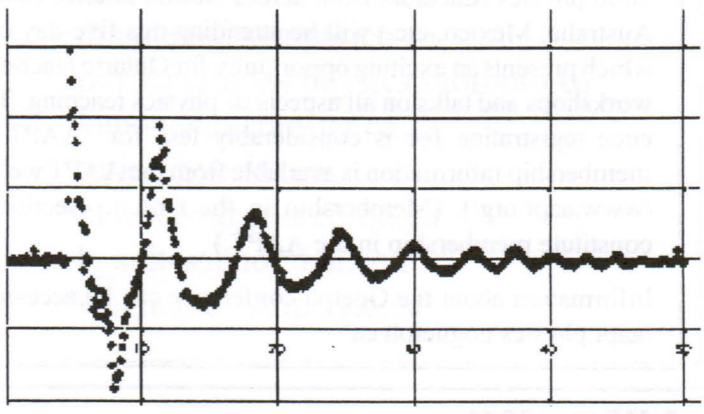
Observe the data and speculate as to the difference between the two.

Robert Freinhoffer (author of Magic Tricks, Science Facts) conducted a workshop on the Magic of Science and then collaborated with Dave Wall (famous for rope tricks), Tom Zepf and Marshall Ellenstein on a second session, more focussed on the Physics of Magic where I learned a number of nifty magic tricks which use physics principles. We made crystal balls with shot glasses and large clear marbles. The marbles are glued into the glasses just leaving enough space that water could get underneath and fill the air gap. A corner of a card (e.g. 5♣) was glued to the bottom. With the glass empty you cannot see anything. Add water and the indices of refraction are just similar enough that viewer sees the 5♣ appear in the bottom of the glass. Combine this with a 'forced cut' of the deck and you have magic! I tried this and it went over well with my class.

Highlights of the week were the Keynote Speakers, Jill Tarter from SETI (Search for Extra-terrestrial Intelligence). William Phillips (william.phillips@nist.gov) gave the Richtmyer Award Lecture, on Time, Einstein, and the Coldest Stuff in the Universe. He explained a new technology for cooling atoms without causing condensation of a gas called 'Laser Cooling'. This was done in order to cool down cesium atoms to around 700nK which corresponds to a thermal velocity of around 7 mm/s with the objective of making more accurate clocks. Brian Greene explained the latest on Superstring Theory. He was a captivating speaker who's book *The Elegant Universe* is available in bookstores.

See *AAPT* on page 3





Ontario Association of Physics Teachers

2000 Annual Meeting

Thursday May 25 - Saturday May 27

hosted by

McMaster University Engineering

OAPT is now welcoming your input for the following...

- Workshops: is there something you'd like to learn about?
- Classroom Demos: do you have a favourite demo old or new to share?
- ISU share-athon: how about sharing your 4A or OA ISU ideas?
- Contributed papers: would you like to present a short paper on current research of teaching tools?

If you would like to contribute to any of the above, or have any comments or requests, please e-mail or fax them to:

Diana Hall
diana_hall@ocdsb.edu.on.ca
fax: 613-828-9002

NOTE: Thursday night workshops will include 2 special sessions for Elementary teachers

AAPT Summer Meeting in Guelph

The American Association of Physics Teachers (AAPT), of which the OAPT is the Ontario Section, will be holding its Summer Meeting at the University of Guelph from July 29 to August 2, 2000. More than 1000 physics educators from across North America (and England, Australia, Mexico, etc.) will be attending this five-day conference, which presents an exciting opportunity for Ontario teachers to attend workshops and talks on all aspects of physics teaching. The conference registration fee is considerably less for AAPT members; membership information is available from the AAPT website (http://www.aapt.org/). (Membership in the Ontario Section does not constitute membership in the AAPT.)

Information about the Guelph conference can be accessed at http://aapt.physics.uoguelph.ca/

Anybody Out There?

Don't forget that I'm always interested in hearing your comments, criticisms, etc.

You can reach me—the editor—by e-mail:

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or, if the mood strikes you, by mailing a letter to:

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OAPT Web Site

Guleph University is host to the OAPT site.

Get info on executive members (including a great picture of me, your humble newsletter editor), the upcoming OAPT Conference, links to other physics web sites, and much, much more!
The URL is:

www.physics.uoguelph.ca/OAPT/index.html

Why wait until it's too late?

The date on your address label is the expiry date for your membership. You may use the coupon below (or a facsimile) to renew it, or to indicate a change of address (or both) by checking the appropriate box. And, hey, what the heck, why not renew it for two (or more!) years; it will save you the hassle of renewing over and over again.

Membership Application

Renewal ❒ Change of Address ❒

Name _____

Address _____

_____

$8.00 / year x __ years = $ ___, payable to the OAPT

Send to: Ernie McFarland, Dept. of Physics, University of Guelph, Guelph, Ontario N1G 2W1; Email: elm@physics.uoguelph.ca

AAPT Meeting (cont. from p. 1)

It was great to see Al Hirsch, now retired, attending the conference. He, his wife Judy and I went on the quest for the 'Sound Bite' which was written about in January's The Physics Teacher. We drove a long way but were successful. I'll be bringing some in the 'prize bag' to MacMaster. Al went on to a conference at NASA which apparently was a fantastic experience and which I'm hoping he will share with us in May. I look forward to seeing you all there and sharing some more neat stuff.

2000 APPARATUS COMPETITION

The annual AAPT Apparatus Competition will be held in Guelph, Ontario on July 30, 2000, during the AAPT summer meeting.

There are two categories - Low Cost Apparatus and Introductory Laboratory Apparatus. Prizes range from $100 to $1000.

Plan now to enter, and notify the Competition Director by May 1 of your intention to enter (for details, see http://www.rose-hulman.edu/~moloney).

Physics News Update

The A. I. P. Bulletin of Physics News
by Phillip F. Schewe and Ben Stein

SNOWBALLS SURVIVE IN HELLISH CONDITIONS. Many of the unique and unusual properties of liquid water at ambient conditions are due to the ability of water molecules to form hydrogen bonds, which in turn causes the oxygen atoms to be arranged in a three dimensional diamond-like network. However, under extreme pressures the properties of water can change drastically. For example, although water ice normally melts at 0 C at ambient conditions, at a pressure of 10 Giga-pascals (10,000 atm) water remains "frozen" up to 320 C! New computer simulations carried out at the Lawrence Livermore National Laboratory have explored what happens to the microscopic structure of the compressed liquid, in a region of the phase diagram where experimentally determined structural data do not exist. These simulations indicate that when the liquid is squeezed up to a pressure of 10 GPa, the hydrogen bonds and oxygen network are substantially altered. At this high pressure, each water molecule is close packed and surrounded by 12.9 molecules, as opposed to 4.5 neighbors for ambient conditions. (E.Schwegler, G.Galli, F.Gygi, Phys. Rev. Lett., 13 March 2000; figure at www.aip.org/physnews/graphics. Select Article.)

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THE DEMONSTRATION CORNER

Two-Minute Impromptu Demos

by

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This article was excerpted (with the authors' permission) from a longer article in *The Physics Teacher* (Sept.1998, p. 356-8).

What can we do to have clear and exciting lessons without a great amount of demonstration apparatus and hours of preparation each day? We present here a collection of small and quick demos that require no equipment beyond what is present in a classroom (chall4 chairs, students, books, paper, backpacks and their contents). Some are to prove something, but most are to illustrate, visualize, or simulate. These basic and well-tried ideas will stimulate the students and revive the insrtuctor who has spent a late night checking student papers. Have fun!

Fig. 1

Free fall and independence of mass. Break a piece of chalk into two pieces, one longer than the other. Hold them between thumb and index finger, with lower ends at the same level (Fig. 1). Ask students to predict which one will hit the floor first if chalks are released simultaneously. Discuss predictions and reasons. Then let go; repeat until all observers agree. Explain.

Kinematics. Walk across the front of the room (a) at constant speed, (b) accelerated and decelerated, (c) stopping and going. Let students draw position-vs-time and velocity-vs-time graphs. Of course you should have brought a motion sensor, but the walking will do just as well. Make sure to walk by the students to see their graphs, discover conceptual errors, and react.

Parallax. Have students close their right eye and hold up a pen at arm's length such that it is in line with a mark on the blackboard. Have students then close the left eye and open the right one. The pen is no longer in line with the mark on the board.

Projectile motion, relative motion. Walk with constant velocity while throwing a piece of chalk straight up. It lands in your hand, not behind you. So the chalk had the same horizontal velocity as you did!

Torque. Illustrate torque using a door. With torque we make things turn around an axis. Push the door at the free end with your finger and it moves easily, but the finger has to move a great distance to move the door 90°. Now push the door close to the axis. The force to be exerted is much greater, but the finger has only to move a short distance to move the door 90°.

Reflection. It's easy to imagine many demonstrations using reflecting objects such as windows, metals, and so on. A spectacular one is to suggest to our class that your whole body will be visible in any mirror as long as you increase your distance from the mirror. Then you disprove the idea by using a mirror that one of the students can surely produce. Beware of convex and concave mirrors here!

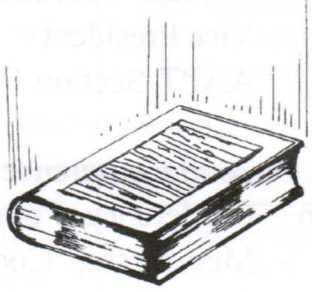

Fig. 2

Fall and air drag. Let a piece of paper drop. It falls slowly. Then crumple it; it drops faster. Take a small sheet of paper and put it on top of a book and drop the book (fig. 2). The paper will reach the floor simultaneously with the book! (No need for the awkward vacuum tube with feather and lead ball.)

Acknowledgment

Illustrations for this paper were done by Renante C. Embalzado, who is studying to become a physics teacher.

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