NEWSLETTER

ONTARIO ASSOCIATION OF PHYSICS TEACHERS
(an affiliate of the American Association of Physics Teachers)
Volume XX, Number 2 **Winter 1998**

1998 Conference - University of Waterloo
June 18 - 20

Plans are well underway for this year's conference. "Tools to Teach Physics" is the theme, and we hope to bring you lots of practical ideas to take home. Here's what's shaping up so far.

WORKSHOPS:

- Interactive Physics for Beginners
  (Bill Syniura)
- Computer Done Tutorials
  (June Lowe)
- Eureka Software
  (Shawn Leclair)
- Pasco Physics Interfaces
  (Bill Konrad)
- Making Holograms
  (George Vanderkuur)

SPEAKERS:

- "Complex Fluids; The Physics of Goo"
  (Stefan Idziak U of Waterloo)
- "Physics of Manufacturing Automobiles"
  (Walt Duley U of Waterloo)
- Future of Physics Education in Ontario
  (Ministry of Education Rep)
- Role of Physics Contests
  (Reps from Contests - discussion)
- Computer Assisted Instruction - Pros/Cons
- "Sound Advice"
  (John Vanderkooy U of Waterloo)

TOURS: Dalsa - Imaging Charge Couple Devices
Unitron - Major Hearing Aid Manufacturers

BANQUET SPEAKER: "30 Years of SIN" - Phil Eastman

CONTRIBUTED PAPERS: TBA (See Call for Papers in this issue)

The University of Waterloo will set up a display of University Demos covering vaious topics. they will also be giving away some surplus equipment such as string vibrators and em magnetic field detectors.

It might be of interest to note that the CAP Annual Conference will be held at Waterloo in the days immediately preceding the OAPT and the Nuclear Technology Workshops will be held at McMaster June 22-25.

For schedule updates check out the following website:

http://www.science.uwaterloo.ca/physics/physics.html

OAPT Conference Committee

This year the annual June conference will be held at the University of Waterloo from Thursday June 18, 1988 to Saturday June 20, 1998. The OAPT conference this year will follow the CAP conference also being held at Waterloo. The end date for the CAP conference is Wednesday, June 17 and the start date fior the OAPT conference is the evening of Thursday June 18. It is hoped that some participants from the CAP will join the OAPT conference.

This year the conference host will be John Vanderkooy, from the University of Waterloo. As well, the following persons from the OAPT executive will be assisting John in the conference planning:

- John Pitre, President OAPT, Chair, conference committee, invited speakers
  pitre@faraday.physics.utoronto.ca
- Terry Price, Vice President OAPT, exhibits for the conference
  tprice@yorku.ca
- Diana Hall, Past President OAPT, Contest Convenor, Contributed Papers for the conference
  Diana_hall@ocebe.edu.on.ca
- Peter Scovil, AAPT Section Rep, Workshops for the conference
  petescov@enoreo.on.ca
- John Vanderkooy, Conference Host, Univeristy of Waterloo
  jv@audiolab.uwaterloo.ca

OAPT members with suggestions for the conference may contact these individuals at the e-mail addresses indicated

OAPT Web Site

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

OAPT 1998 Conference Call for Papers

Do you presently use Computer Lab interfaces in your classroom? Do you have a favourite Classroom Demo?

The theme to this year's conference is "Tools for Teaching Physics." In keeping with this theme, we are particularly looking for members who would be interested in presenting a short paper on either of these topics. Many members are struggling to incorporate hands-on, computer activitites into the curriculum on a short budget. If you have tools which have been implemented succesfully, we would like to hear from you.

Members indicate that they like to take from the conference simple, new (or old) tricks or demonstrations to use in their classrooms. If you have one that works well, we hope that you will consider sharing it.

As always, we invite members to present papers on other topics which are of interest to high school and university physics teachrers. The paper should be 5-15 minutes in length. Please send an abstract of your proposed paper as soon as possible to:

John Vanderkooy, University of Waterloo Physics Department,
Waterloo, ON, N2L 3G1
e-mail: jv@audiolab.uwaterloo.ca

Call for Questions:

Now is your chance to contribute to the 20th aniversary of the OAPT Prize Contest! have your name acknowledged on the front page! If you have an interesting or creative question, simple or challenging, send it to Contest Coordinator Doug Abe at:

Agincourt C.I.
2621 Midland Ave.
Scarborough, ON
M1S 1R6
or via e-mail to dougabe@echo-on.net

All donations are cheerfully accepted! Send in those pet questions and see your name in print!

Anybody Out There?

Don't forget that I'm always interested in hearing your comments, criticisms, etc. (besides, it lets me know that someone is reading this thing). You can reach me—the editor—by e-mail: pdlaxon@julian.uwo.ca (NOTE: e-mail address has changed)

or, if the mood strikes you, by mailing a letter to: OAPT Newsletter
c/o Paul Laxon, 201 Chestnut St., St. Thomas, ON, N5R 2B5

Physics News Update

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

THE UNIVERSE WILL EXPAND FOREVER. This prediction is based on new studies of distant supernovas. Because Type Ia supernovas (supernovas in which material falling onto a white dwarf from a companion object ignites violently) brighten and fade in such a predictable way, their intrinsic brightness (and their distances from Earth) can be determined by carefully watching light emission over time. Combining these distances with the velocities of the host galaxies (determined from redshifts) allows one to calculate the expansion of the universe with some confidence. And the result appears to suggest that the universe does not have enough matter (visible or dark) to halt the current expansion. This view emerged two weeks ago at the meeting of the American Astronomical Society in Washington, where optical data for many new supernovas (including the most distant supernova ever observed, one with a redshift of 0.97) were reported by a group from LBL (led by Saul Perlmutter) and one from Harvard-Smithsonian (Peter Garnavich). The new findings are consistent with an age estimate for the universe of 15 billion years.

COSMIC INFRARED BACKGROUND DISCOVERED. The Cosmic Microwave Background Explorer (COBE) collaboration, which six years ago reported the first evidence for structure in the microwave background, has now finished a mapping of the whole sky at ten different infrared wavelengths, from 1 to 240 microns. After carefully subtracting the expected contributions from our own solar system and the Milky Way galaxy (understanding the foreground sources of infrared was itself a process that took years) what is left over is the cosmic infrared background, the cumulative IR radiation (amounting to one-half to two-thirds of the total light) coming from all the stars that have ever existed. Much of the light that reaches the detector has been scattered in transit by dust. The cosmic IR background appears uniform (no structure is apparent) and bears no information about when during the history of the cosmos the radiation was emitted. Nevertheless, the observations have helped to provide rough limits on the amount of star formation in the universe and confirms the suspicion that a lot of star birth has been obscured by dust. Michael Hauser, now at the Space Telescope Science Institute, delivered the main COBE report at last week's meeting of the American Astronomical Society (AAS) in Washington, DC.

A 2.6 MILLION SOLAR MASS BLACK HOLE lurks at the center of the Milky Way. New measurements carried out with optical and radio telescopes have zeroed in on the heavy monster long known to exert a huge gravitational pull at the heart of our galaxy in the constellation Sagittarius. Andreas Eckart of the Max Planck Institute in Garching, Germany presented a film at the AAS meeting showing the proper motions (recorded over five years) of several stars within a few light days of the heavy object. The measured velocities of these stars, some as great as 1000 km/sec, lead to a mass estimate for the object of 2.6 (with an uncertainty of only 0.3) million solar masses. Considering that all of this mass must fit into a volume much less than the distance between us and the nearest star, Eckart asserted that the object could only be a black hole.

THE DEMONSTRATION CORNER

A Crazy Cantilever

by

George Vanderkuur

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Bricks, books, or metre sticks are all you need for this neat demonstration. As illustrated, the top brick projects by half its length and subsequent bricks project 1/4, 1/6, 1/8, etc., brick lengths. After n bricks, the cantilever will project a distance $d = 1/2 + 1/4 + 1/6 + ... + 1/(2n)$. This may be simplified to $d = 1/2(1+1/2+1/3+...+1/n)$. For four bricks, the projected distance is 1.04 brick lengths, and for n = 5, the distance is 1.14 brick lengths (so that the top brick is clearly out beyond the edge of the table).

There are complicated ways of determining the maximum projection for each brick. Even though the physics is simple, the equations soon become unwieldly, requiring clever techniques that I have forgotten. There is, however, an easy way to look at the problem. Just consider the total projected mass at various levels in the stack. Above the second brick from the top, there is one-half brick mass projected. Above the third brick from the top, there is the half brick mass just mentioned, plus two quarters (one quarter from the second brick and another quarter from the top brick). Above the fourth brick from the top, the total projected mass is one half plus two quarters plus three sixths. This arrangement ensures that the cantilever exactly balances on the front edge of each brick because at each stage an additional half brick mass is added to the total overhang. The centre of mass of the projected portion is balanced by the centre of mass of the rest of the stack. (You might want to think in detal about how this scheme works once one or more bricks are completely projected beyond the table edge, so that they can't contribute any more projected mass.)

Physics Internet Sites

These sites contain help and information for all levels of physics enthusiast, from novice to expert: with essays on how to "Think like a physicist" and e-mail connections to physicists who will answer any questions on physics related topics (but not specific questions about homework problems) and links to physics humour and cartoons.

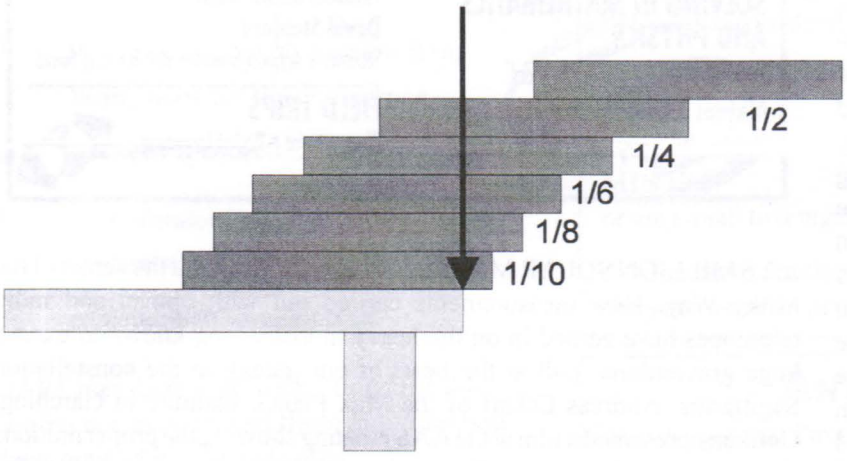
Ask the Physics Guy
http://www.gwi.net/~eiko/physicsguy.htm

Ask Dr. Neutrino
http://odin.phy.bris.ac.uk:8080/dr_neutrino/index.html

Help for Math and Physics Students
http://www2.ncsu.edu/unity/lockers/users/f/felder/public/kenny/home.html

The Math and Physics Help Home Page
http://www.cyberspc.mb.ca/~dcc/phys/physhelp.html

The Physics Connexion
http://www.servtech.com/public/wkimler/



Is This Device Practical?

Not really -- the structure soon fails because the load is carried entirely at the front edge. The compression forces are greater than what normal materials are able to withstand. Disregarding this, the cantilever could extend to infinity because the sum $1/2(1+1/2+1/3+...+1/n)$ has no limit. It would take 100 bricks to extend 3 brick lengths, and to extend about ten brick lengths would take over 1,000,000 bricks!

It is hard to imagine how a loose stack of bricks could extend out infinitely far. It should make for a lively discussion.

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Email: elm@physics.uoguelph.ca

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