Attn: Science Dept. Heads, Science & Physics Teachers
To sign up for this newsletter, visit: www.phas.ubc.ca/outreach

University of British Columbia

Volume 3 Issue 1 June 2010
National / British Columbia Version

PHYSICS & ASTRONOMY

Outreach Program News

In This Issue…

Upcoming Events

- Free lecture (BC): Catching Electrons with Light (July 13th)
- Free lecture (BC): An Atom from Vancouver (July 4th)

Report

- The Michael Smith Challenge, 2010

Teaching Resource

- C21 - Physics Teaching for the 21st Century website

Programs

- Engineering Physics Program
- Science One Program
- Dual Degree Program

Welcome to the new issue of **UBC Physics & Astronomy Outreach Program News**!

There are two eye opening public lectures coming up:**"Catching Electrons With Light?"** by Dr. Paul Corkum and **"An Atom from Vancouver"** by Dr. Lawrence Krauss. If you are a teacher, perhaps you would be interested in learning more about Canada's only National Science Competition for students in Grade 10 and under, the **Michael Smith Challenge.** Or, read about how our **C21 website**, a free online physics teaching resource, can help you connect real life issues to physics teaching in class.

Thank you for your interest in Science Outreach and we hope you enjoy the issue!

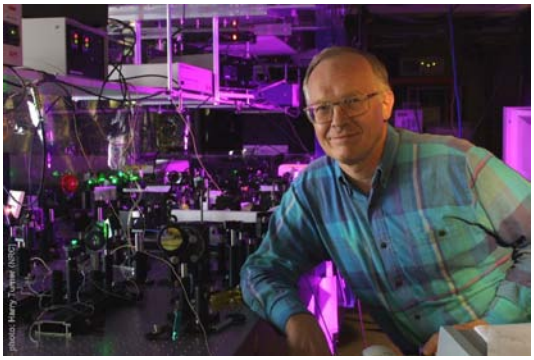
Contact Us
Theresa Liao, Communications Coordinator
Physics & Astronomy Outreach, University of British Columbia
6224 Agricultural Road, Vancouver, BC V6T 1Z1
Email outreach@phas.ubc.ca; Phone: 604-822-3675; Fax: 604-822-5324

Free Public Lecture!

Catching Electrons with Light? (BC) - Tues, July 13th, 8pm

By Dr. Paul Corkum

Steacie Institute for Molecular Sciences,
National Research Council, Ottawa, Canada



Lasers can now make light flashes fast enough to photograph the atoms and electrons in a molecule!!

Join us to:

- Learn how we can use this new technology
- Discover insights into the molecular world
- Explore the frontier of laser technology

& Celebrate the 50th anniversary of the very first laser!

Time: Tuesday, July 13th at 8pm
Location: UBC Life Sciences Centre Auditorium #2 (2350 Health Sciences Mall)
Presented by the VUVX2010 Conference - www.vuvx2010.ca

Free Public Lecture! Saturday July 4th at 3pm

TRIUMF and INPC2010 present: An Atom from Vancouver (BC)

By Dr. Lawrence Krauss

In a captivating and engaging talk, internationally renowned theoretical physicist Dr. Lawrence Krauss will trace the story of a single atom – from the beginning of the Universe, before atoms themselves existed, until the end, as we currently envisage it. This atom's story will lead us to confront some of the most exciting new discoveries in physics, cosmology, geology, and biology, as well as some lessons about our own place in the Universe.

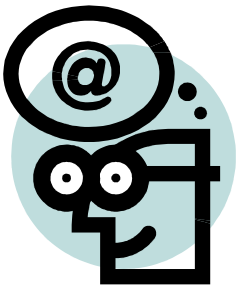
Lawrence M. Krauss is an international leader in cosmology and astrophysics, author of over 250 scientific papers, and winner of numerous national and international awards. He is the author of several popular-science books, including the bestseller The Physics of Star Trek. He is a Foundation Professor in the School of Earth and Space Exploration, a professor of physics, Co-Director of the Cosmology Initiative, and the Founding Director of the new Origins Initiative at Arizona State University.

Time: Sunday, July 4th 2010, 4:00pm
Location: The Chan Centre, UBC (6265 Crescent Road)
Reservations not required. Doors open to the public at 3:30pm.

Michael Smith Challenge Report

The Michael Smith Challenge (National)

A Challenge on Logical Thinking for Astronomy, Biology, Chemistry, Earth Science, and Physics



The Michael Smith Challenge is a national science contest for students in Grade 10 or lower. The questions in the challenge emphasizes the use of logical thinking to solve scientific problems, and aim to stimulate student interest in science. The Michael Smith Challenge is the only national science competition at the Grade 10 level in Canada. It is also the country's only science contest covering all scientific disciplines.

This spring, over 1300 students from 10 provinces wrote the contest, with 28 students receiving a mark above 80%. The highest scoring student, who had a perfect score, received a prize of $500. The 2nd place student was awarded $250, and the 3rd place student $100. The top student from each province who did not receive a national prize was awarded $100. Teachers of all these prize-winning students received a $50 prize. Certificates to recognize achievement were awarded to the top 3 national prize winners, the provincial prize winners and to the overall top 1%, 10%, and 25% of students.

Want to learn more? Consider participating in the challenge next year? Visit our website for more information on the Challenge and past exams / analysis: **www.smithchallenge.ubc.ca**

A sample question from the 2010 challenge is included below:

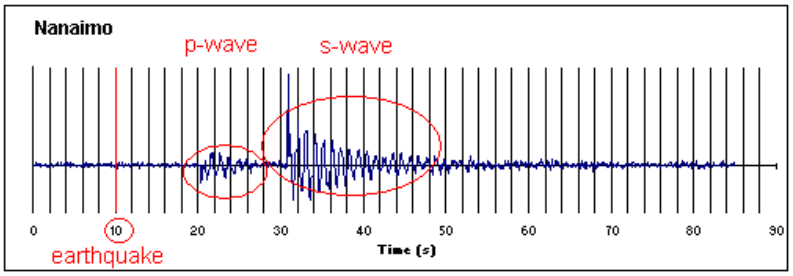
Michael Smith Challenge Report cont.

Question (with markscheme):
Seismographs located in Nanaimo, Kelowna, and Victoria record an earthquake. In this region, assume s waves travel at 4000 m/s and that p waves travel at 8000 m/s.

Question 6A: Circle and label the p waves and s waves on the Nanaimo seismograph.

Question 6B: What time did the earthquake occur? Mark the time on the Nanaimo graph

Question 6C: Where was the epicentre of the earthquake? Use all three seismographs. Feel free to draw on the map provided



Marking Scheme:

6A

2 Marks: *Correctly identifying p and s waves.*

6B

0 Marks

6C

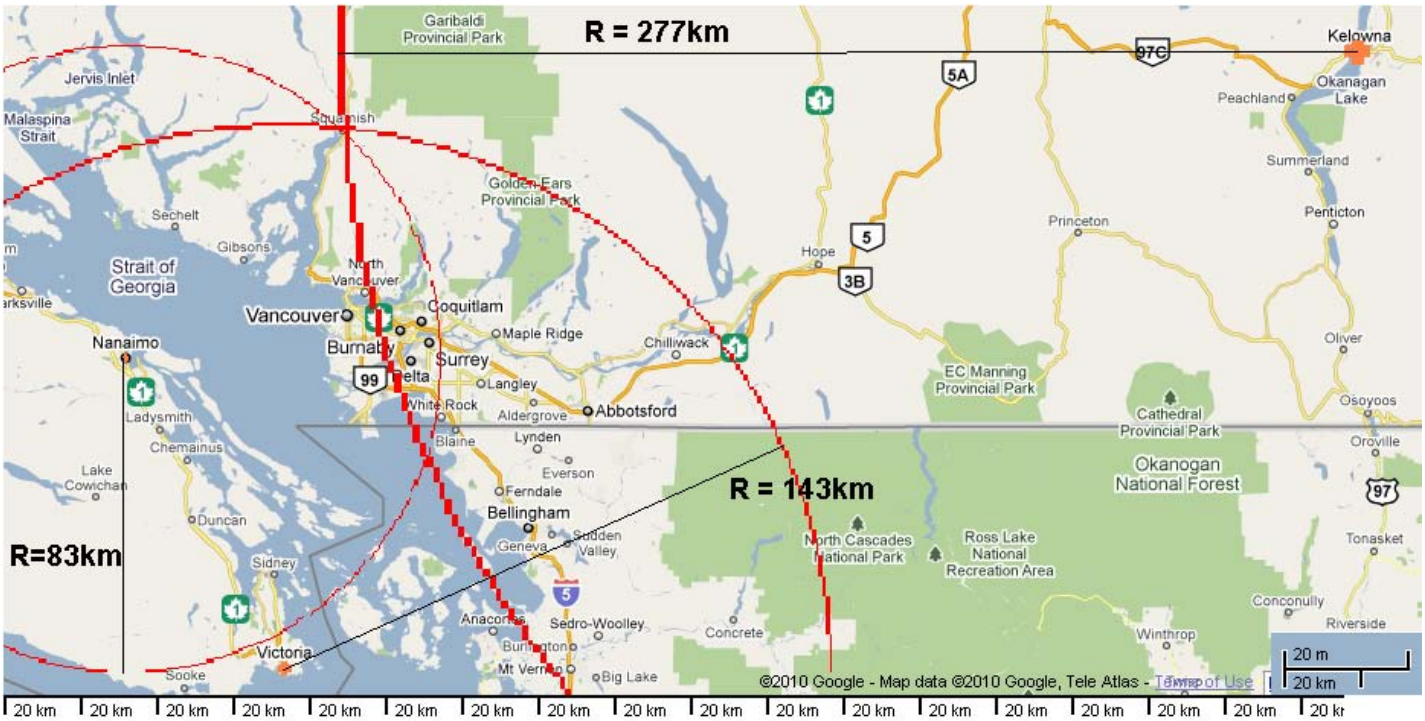
2 Marks: *Using the correct earthquake start time (10s) for calculations.*

2 Marks: *Calculating the correct distances between the earthquake and each city based on the chosen start time.*

1 Mark*: Drawing intersecting circles to locate the epicentre*

1 Mark: *Identifying Squamish as the epicentre*

Nanaimo: $t_s = 20.75s$ $d = (4km/s)(20.75s)$ $= 83km$	*Kelowna* $t_s = 69.25s$ $d = (4km/s)(69.25s)$ $= 277km$	*Victoria* $t_s = 35.75s$ $d = (4km/s)(35.75s)$ $= 143km$
Nanaimo: $t_p = 10.38s$ $d = (8km/s)(10.38s)$ $= 83km$	*Kelowna* $t_p = 34.63s$ $d = (8km/s)(34.63s)$ $= 277km$	*Victoria* $t_p = 17.88s$ $d = (8km/s)(17.88s)$ $= 143km$



Teaching Resource

C21 – Physics Teaching for the 21st Century

- ***Have you ever wondered how long you have to ride you bicycle to burn off a doughnut? Or how fast a nerve impulse travels? Will the icelandic volcano cool us off? Is global warming bunk?***
- ***Does throwing a paper airplane have anything to do with the fuel consumption of a Boeing 747?***
- ***Are cycle commuters, who take an extra shower, doing more damage to the environment than those who commute by car?***

Physics is a core subject that deals with many real life issues, such as reusable energy, climate change and medical advancement, yet it is often taught in abstract contexts which students can not relate to. How often are students going to be pushing square boxes down incline planes, let alone frictionless ones! Upon surveying teaching, we found that teachers believe that the goals of physics teaching are both to help their students understand the physics concepts and to relate them to real world contexts. With this in mind, a team of physics instructors at the University of British Columbia set out to develop an extensive online database of materials which can support instructors who want to incorporate real world physics examples and problems into their courses (**http://c21.phas.ubc.ca**).

On this website you will find articles on topics such as Renewable and Clean Energy, Energy Use at Home, Climate, Transportation and Biology and Medicine. There is also a Skills and Techniques section which presents dimensional analysis, order of magnitude calculations and debating tips!

Each of these topics are comprised of a variety of resources including:

- overviews that clearly explain the physics concepts in a real world context
- lecture notes in the form of power point presentations
- multiple choice questions and problem sets (including solutions) which interest students as they exploiting the real world contexts
- take-home experiments (with sample data sets and write-ups) that can be done by students or by teachers as demonstrations in class

Now, we are beginning to make the site more interactive, including videos, RSS feeds, screen capture tutorials and more. We even have a Facebook page to inform instructors about updates and to allow them to dialogue with other users!

To explore our resources, learn more about motivation behind this project, or join our Facebook page, check out our website at **http://c21.phas.ubc.ca**!

Programs

Engineering Physics at UBC

...Turn Ideas into Reality...

Engineering Physics at UBC is a **challenging interdisciplinary degree** designed to train those who wish to work at the **leading edge of scientific and technological innovation**. By applying the fundamentals of physics with the practicality of engineering, our students are given the skills to become tomorrow's inventors, technology leaders, discoverers of new science, and developers of new medical techniques.

The Engineering Physics program combines an **Honours Physics degree with an Engineering degree in Electrical, Mechanical, Computer, or Mechatronic options**.

For more information, please visit: **www.engphys.ubc.ca**
Or, contact the UBC Engineering Physics Program
Tel: 604-822-6451; Fax: 604-822-5324
Email: **andre@physics.ubc.ca** (Director Andre Marziali)

Passionate about Science but concerned about big first-year classes and impersonal teaching?

Consider: UBC Science One Program

An Integrated First-Year Science Program at the University of British Columbia

Program Features:

- Integrated Science
- 1st Year (both terms)
- 75 students
- 8 faculty members
- 25 credits + 2 for co-req Bio 140
- Small-group learning
- Proven results

Observe... the natural world and universe around you

Describe...use mathematics to speak precisely about the world around you

Understand...experience the joy of insight

Synthesize...use fundamental principles to form a wholistic view of the subatomic realm, chemical reactions, genetics, ecology, climatology and cosmology

Apply...what you have learned to entirely new situations

Learn...how to learn

Think...like a scientist

Become...a scientist

For full information and application webform: www.scienceone.ubc.ca

You will be asked to write a short essay describing your passion for science.

A separate application for admission to UBC Faculty of Science is required.

Academic Requirements:
Completion of Biology 11 or 12, Physics 12, Chemistry 12, Pre-Calculus 12 or Principles of Mathematics 12, and Calculus 12, each with a minimum of 80%. A minimum of 80% in English 12 or English Literature 12 or an LPI score of 5 or higher, or an exemption from first-year English.

Questions? Email our office at **science1@interchange.ubc.ca**

Dual Degree Program: Mathematics or Physics and Education

Year	
1st	Standard Science
2nd	Physics/Math + Education Seminar & Practicum
3rd	Full Entry

Special Program Features:
- **5 year program**
- **2 Degrees (B.Ed. & B.Sc.)**

Speed - shorter and few credits

Flexibility - can return to B.Sc. in 4th year

Depth - learn about teaching mathematics and physics while being a student yourself

Variety - combine mathematics and physics courses with children

Proven - concurrent education is a good way to become a good teacher

More Information:
www.math.ubc.ca/Ugrad/education
www.phas.ubc.ca/education

Applications to the dual degree program will be considered in the spring of your 2nd year.

An average of 65% is required to apply.

You must be ready to volunteer with children ages 13-18.

Interested?
Contact Professor Chris Waltham at:
cew@phas.ubc.ca

There is a shortage of physics and mathematics teachers throughout the entire nation!