



The 4th IUPAP International Conference on Women in Physics



Attracting Girls to Physics at All Academic Levels: A Canadian Perspective

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**NSERC
CRSNG**

*National Science &
Engineering Research
Council of Canada*



*Canadian
Association of
Physicists*



*Perimeter Institute for
Theoretical Physics* 1

Goals of the Presentation

- I. Outline Canadian challenges
- II. Describe Canadian solutions
- III. Explore international collaborations

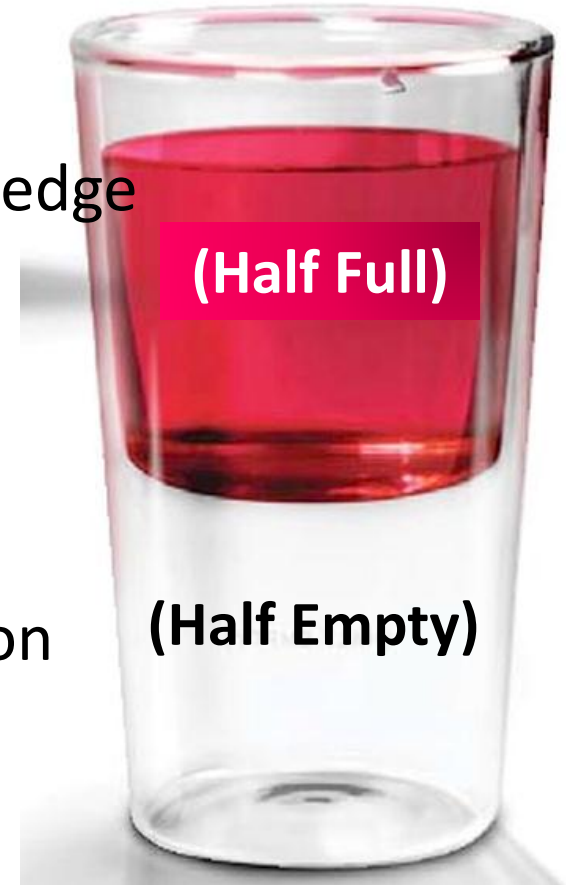


In Order to Have Women Physicists We Have to **Engage Girls in Physics**



I. Challenges: Half a Glass Full?

1. Vast but scarcely populated country
2. Elementary teachers' poor science knowledge
3. Not enough high school physics teachers
4. Limited funding for science outreach
5. High performance of Canadian students on international science and math tests
6. Youth' negative science attitudes



Canada: 0.5% of World's Population

<i>Population ρ rank</i>	<i>Country</i>	<i>Population</i>	<i>Area – km²</i>	<i>Population ρ per km²</i>
1	 Monaco	33,000	1.95	16,923
53	 Germany	82,000,000	357,022	235
170	 South Africa	50,500,000	1,219,000	41.6
178	 United States	310,000,000	9,629,091	32.0
228	 Canada	34,000,000	9,985,000	3.73
239	 Western Sahara	416,760	266,000	1.57
240	 Greenland (Denmark)	57,000	2,175,600	0.0263



Challenges of Science Education in Canada



Science and Math Background of Elementary Teachers

1. Teachers teach **all subjects in grades K-7**
2. **Education:** B.A. - **1 general science course** beyond high school and **1 algebra course**
3. Many are math and science phobic
4. **In teacher education programs:** one science and one mathematics methods course in 1 year teacher education program (18 hours/course)
5. **Elementary curriculum** has relatively high science and math standards

Science Education Funding in Canada



Natural Sciences and Engineering
Research Council of Canada

Conseil de recherches en sciences
naturelles et en génie du Canada

NSERC



Sc. Ed.



Canadian Institutes
of Health Research

Instituts de recherche
en santé du Canada

CIHR

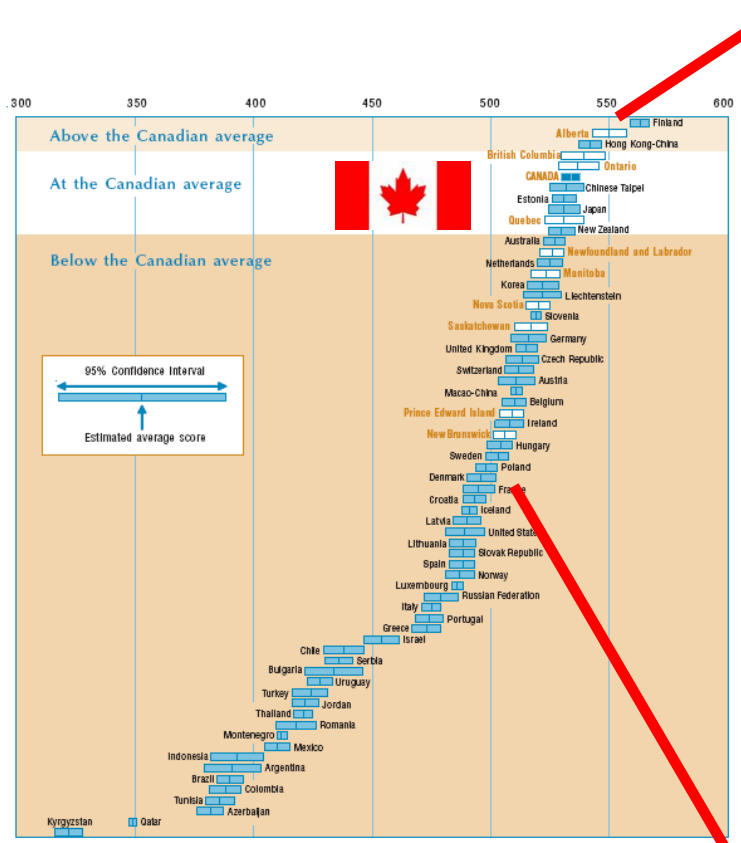
SSHRC



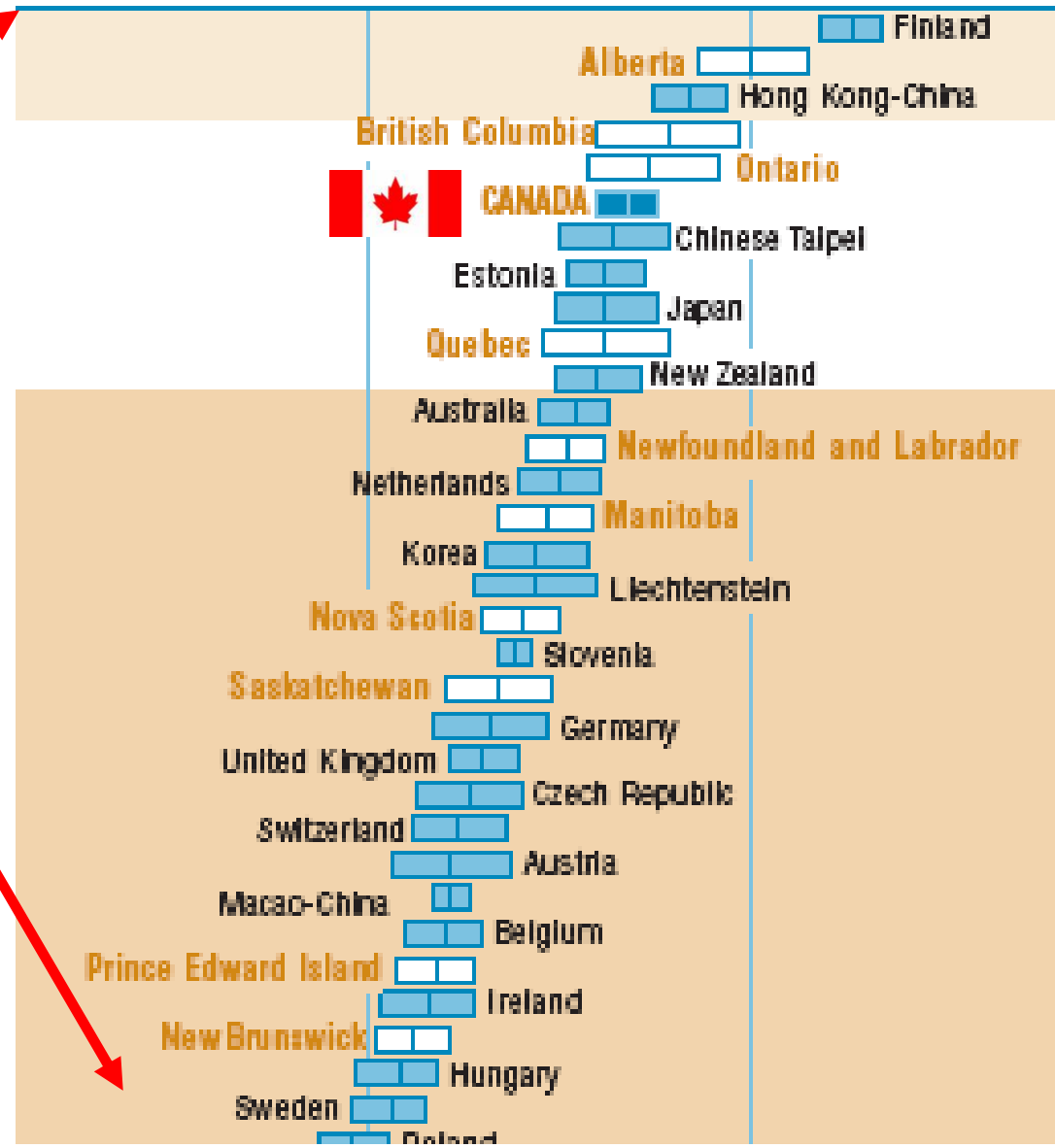
Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canadian Performance Worldwide: PISA 2006



Note: The OECD average is 500 with a standard error of 0.5.



Of 57 countries who participated in the PISA 2006 Canadians were 3rd.

Canadian Teen's Don't Like Science:

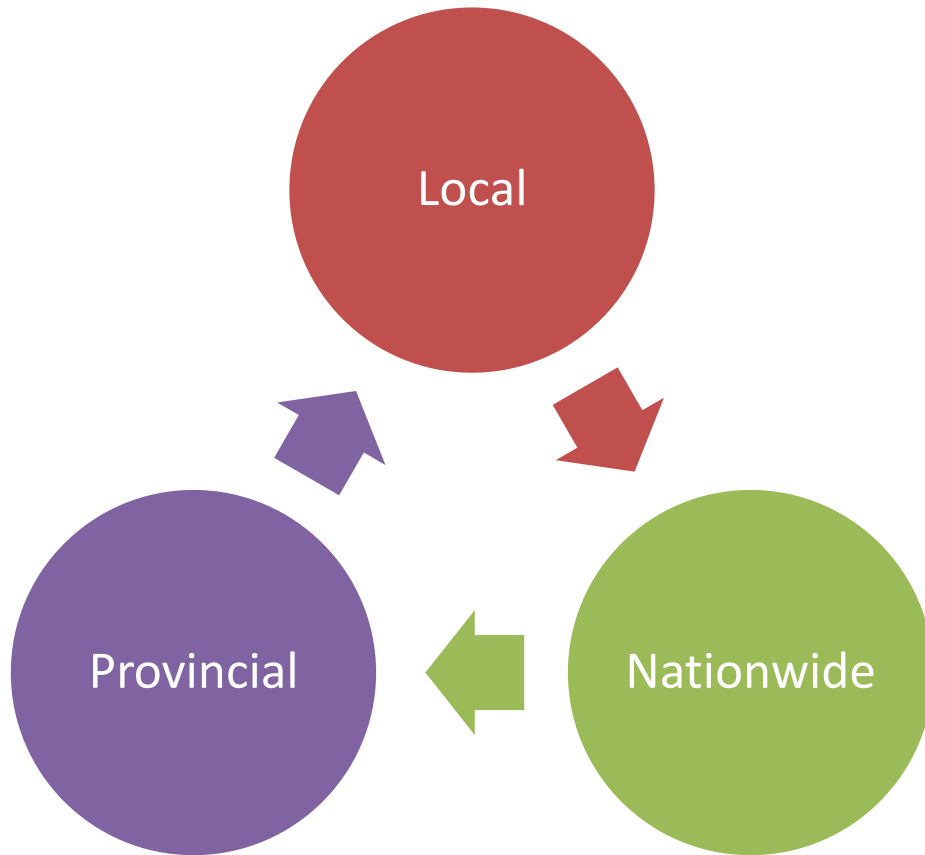
Angus Reid survey of 502 Canadian 16-18 year old teens

Canadian students' opinions and beliefs about scientists	
37%	Aren't interested in taking a science course in university
82%	Recognize that studying science open career paths
84%	Perceive a decline in # of science students has a negative societal impact
81%	Perceive people working in science as intelligent
54%	Perceive people working in science professions as serious
4%	Perceive scientists as cool

"There is clearly a disconnect between Canadians' theoretical belief in the value of a science education and students' actual intentions,"


Bonnie Schmidt, president of Let's Talk Science

II. Canadian Solutions



- Business-University-Government partnerships
- Collaborations with teacher organizations
- Collaborations with parents and communities
- Lobbying government for science outreach funding

Special Events for Girls



Girls Exploring Physics

A Workshop for Girls in Grades 9 and 10
At Simon Fraser University

- 1) **Activities:** Exploring Physics Through Candy and Lighting for Efficiency and Drama.
- 2) **Discussion:** Career opportunities available to university physics graduates.
- 3) **Networking:** Participants meet women physics faculty and students.

Simon Fraser University



LOCAL: SFU



Family Science Day at UBC



Engaging children while
educating future teachers

LOCAL: UBC Faculty of Education

Educating Science Communicators



Graduate Diploma in **Science Communication**



Engaging Canadians in Science



Local: Laurentian University Initiative

Science Rendezvous Ontario



Provincial

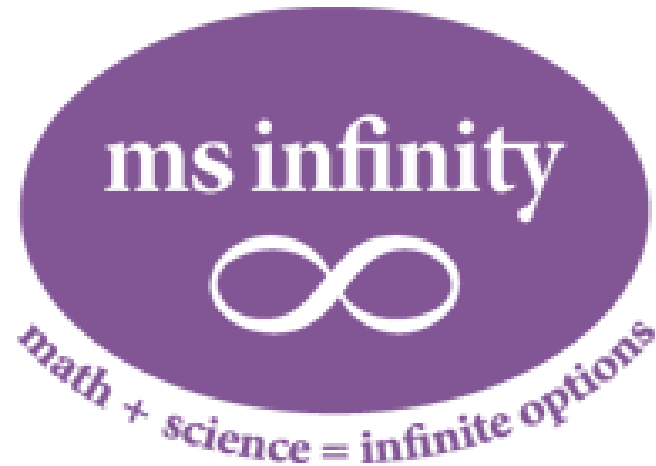
In 2008, a group of science faculty at the University of Toronto got Science Outreach Grant to initiate a Free Science Day in Toronto. The event spread out to all Ontario. **The free grassroots science festival makes science accessible to thousands of people at universities, hospitals, malls, institutes, etc. It is the largest public science day in Canada.**

Provincial: BC Year of Science

The screenshot shows the homepage of the BC Year of Science website. At the top, there is a yellow banner with a blue button that says "ENTER TO WIN" next to an atom icon. To the right of the banner are social media icons for Facebook, YouTube, Twitter, LinkedIn, RSS, and a share icon, with the text "Follow Us" above them. Below the banner is a search bar with a "SEARCH" button. A blue navigation bar contains the following menu items: Home, Get Involved in Science, Science in BC (highlighted), Stories, Scientists & Careers, Calendar of Events & News, Multimedia, and Science in Government. On the left side, there is a vertical menu under the heading "SCIENCE IN BC" with the following items: » Provincial Themes, » Vancouver, Coast and Mountains, » Northern B.C., » Vancouver Island, » Thompson Okanagan, » Cariboo Chilcotin Coast, » Kootenay Rockies, and » Related Links. The main content area features a large image of a city skyline reflected in water. Overlaid on this image is a blue box with the text: "Business Community" in yellow, "Science is alive and well for British Columbia's business community. Companies o..." in white, and "Read More »" in yellow.

Provincial: Funded by BC government & industry

Ms. Infinity: BC and Yukon



**Society for Canadian Women
in Science & Technology**

Ms. infinity Programs across
British Columbia and the Yukon
expose young women to
science/education career options
via providing positive female role
models. **Ms. Infinity attempts to
defy stereotypes of science
careers and women scientists!**

Provincial

Operation Minerva



Started in 1988 by Alberta Women's Science Network (Women scientists in academe, business and industry)

Provincial: Provincially and federally funded

- **Raise awareness** of underrepresentation of women in science.
- Provide girls with opportunities to meet positive female role models.
- **Foster network building** among young female students.
- **Increase the numbers of girls** pursuing technical careers.

Techsploration, Nova Scotia

Techsploration



To encourage girls in grades 9-12 to explore science careers



Province wide: sponsored by provincial and federal government, industry and businesses

Canadian Association for Girls in Science



Larissa Vingilis-Jaremko

In 1992, a 9 year old girl founded the Canadian Association for Girls in Science, a non-profit organization dedicated to promoting science, technology, engineering, and mathematics interests to girls aged 7-16.

Nationwide: government industry collaboration

Let Us Talk Science

Let's Talk Science
Partnership Program
at the University of Toronto Scarborough



Welcome Volunteers Educators Supporters
Contact Us



Nationwide
program linking
scientists and
science students
with the schools

Nationwide: government + industry

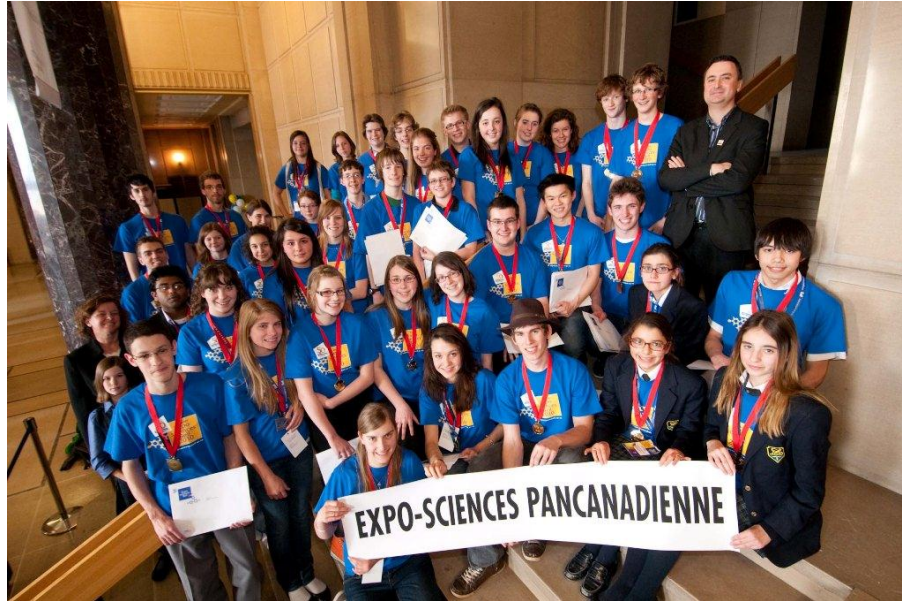
Scientists and Innovators in the Schools



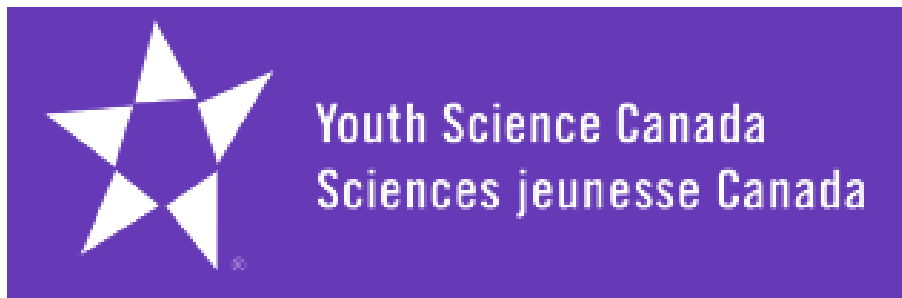
Scientists volunteer to visit schools with science presentations. The visits are funded (transportation and materials by SIS) who also links teachers and scientists.

Nationwide: Provincially and federally funded

Canada-wide Science Fair



Attracts thousands of Canadian boys and girls at local (schools), regional (districts), provincial and national levels. Every province and territory sends students to the National science fair. A team size varies from a dozen to hundreds of students. Many of whom are girls.



**Youth Science Canada is
50 years young!**

Nationwide: Provincially & federally funded

EinsteinFest & EinsteinPlus at PI

PI's mandate includes an outreach program that reaches students, teachers and Canadian and international general public.



EinsteinFest, 2005 attracted over 28,000 in a span over three weeks

Nationwide: Business and provincial government

Perimeter Institute's Initiatives



a place of mind



THE UNIVERSITY OF BRITISH COLUMBIA

WESTCOAST WOMEN
IN ENGINEERING, SCIENCE,
& TECHNOLOGY

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BLOG ARCHIVE

- » February 2011
- » January 2011
- » December 2010
- » November 2010
- » October 2010
- » September 2010

JULY 19 TO 21 – WOMEN IN PHYSICS CANADA CONFERENCE

By [tiechko](#) on March 17, 2011

"Women in Physics Canada" is a conference for young women in physics, to be held at Perimeter Institute and the Institute for Quantum Computing this summer (July 19th – 21st 2011). The conference is aimed at undergraduate and early graduate women studying physics, and will consist mostly of student presentations. Those who have not yet had the opportunity to complete a research project are welcome to participate as well. There will also be several keynote lectures, opportunities for discussions with more senior physicists, and interactions with our invited speakers and local researchers.



Nationwide: funded by business + government

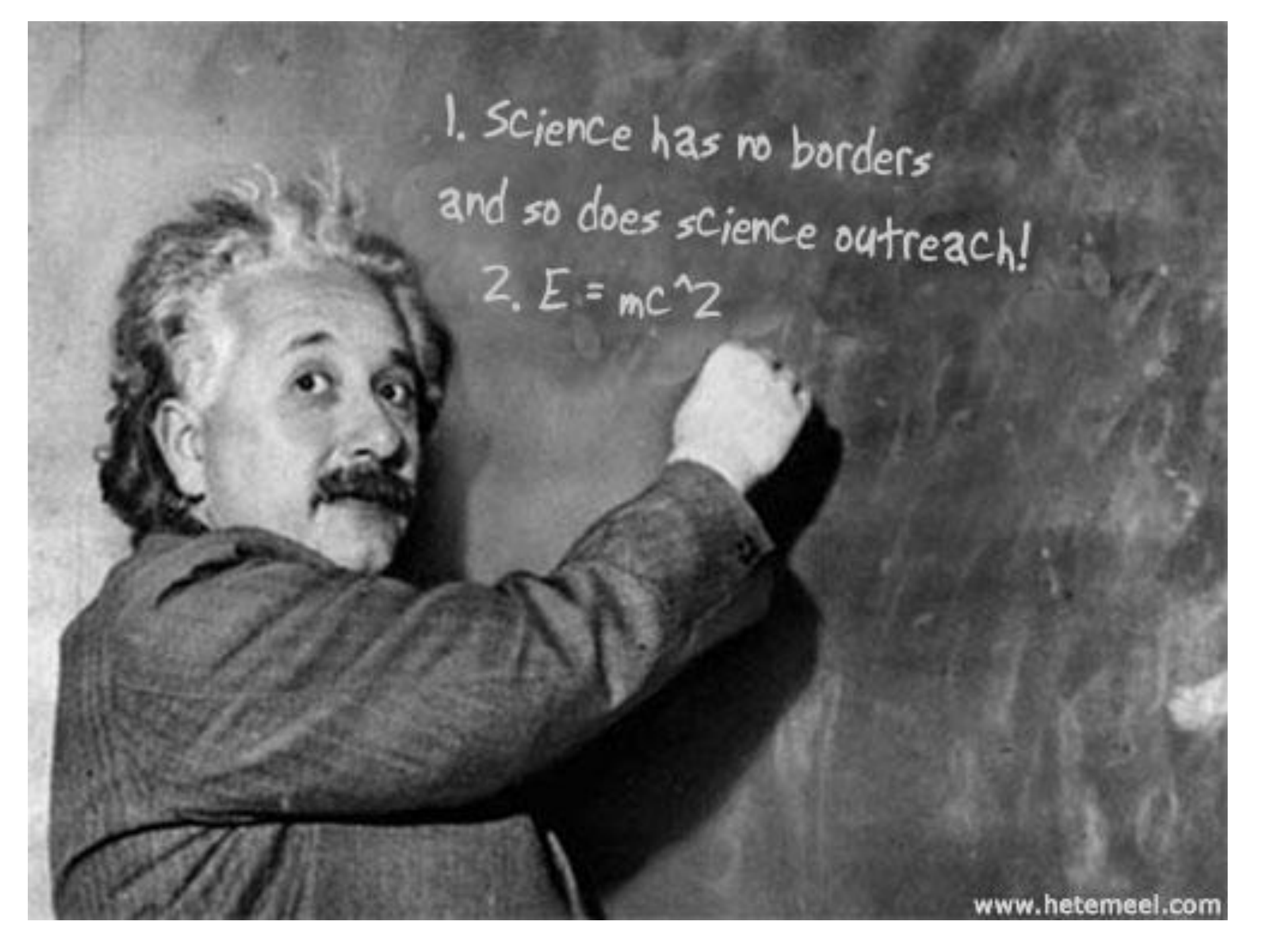
III. International Collaborations



20 of Canada's top high school scientists (**11 girls**) have been selected by Youth Science Canada to represent the country at the Intel International Science and Engineering Fair: May, 2011 in Los Angeles, CA.

Questions: Crossing the Borders

- How can we promote international outreach collaboration to engage ALL kids in science?
- How do we link teachers of science internationally?
- How do we share great science outreach ideas?
- Do we need to have an **International Science Outreach Forum?**



1. Science has no borders
and so does science outreach!

2. $E = mc^2$