Title: Talking to My Dog about Science: Weblogs and Public Outreach

Date: Sep 08, 2008 11:00 AM

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Abstract: At a time when the great challenges facing our civilization are scientific in nature (climate change, sustainable energy, pandemic disease), improving the voting public\'s understanding and appreciation of science is more important than ever. I will argue that the Internet in general and weblogs specifically provide an opportunity to address this problem, both through bringing science outreach directly to the public, but also by humanizing scientists to the public. I will illustrate with examples from my own experience blogging about physics for a popular audience, including explaining quantum mechanics to my dog.

Talking to My Dog About Science

Weblogs and Public Outreach

Chad Orzel

http://scienceblogs.com/principles/

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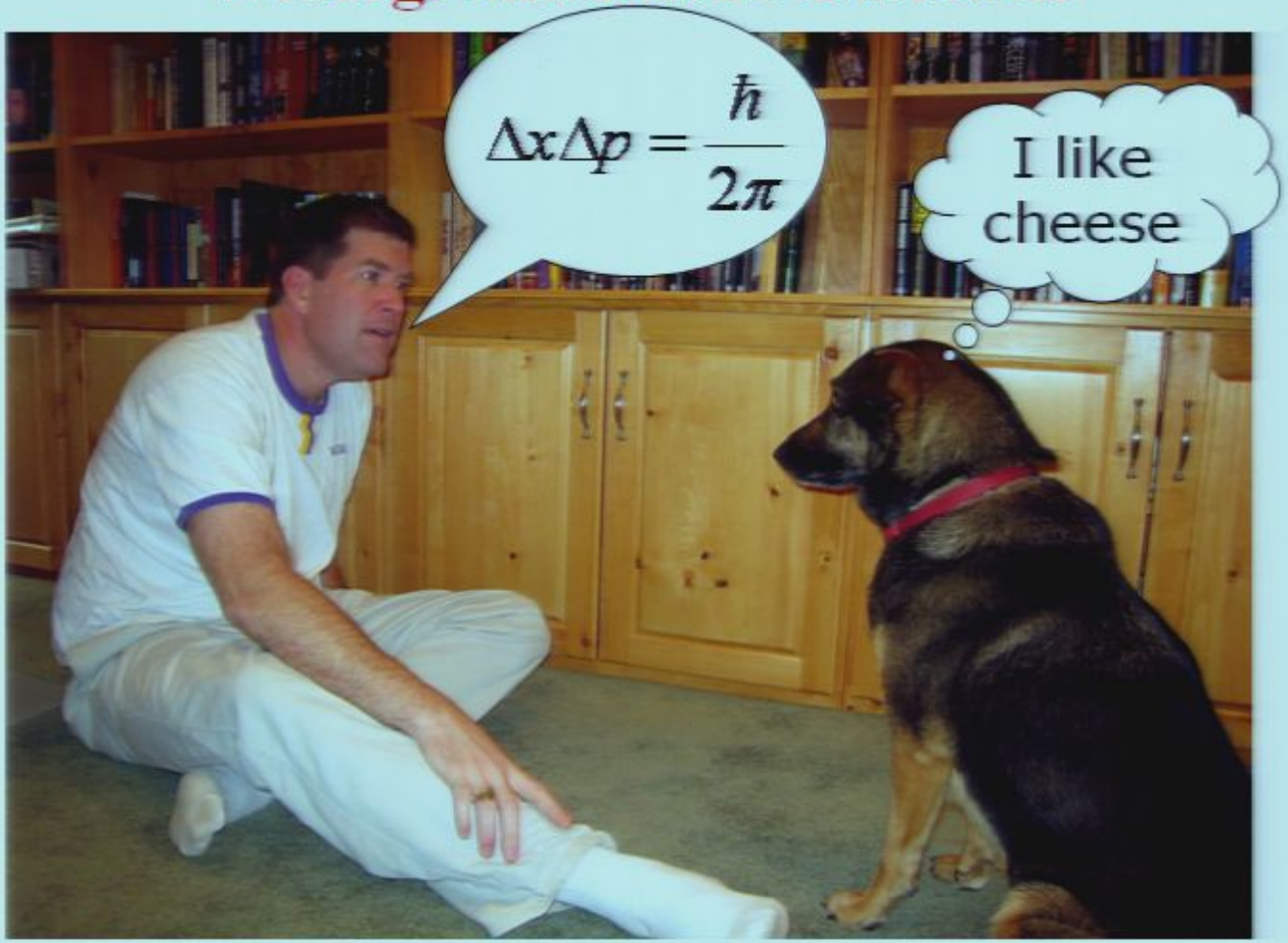

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Uncertain Principles

$\Delta x \Delta p \geq \frac{\hbar}{2}$

Uncertain Principles

Physics, Politics, Pop Culture

$\Delta E \Delta t \geq \frac{\hbar}{2}$

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Profile

"Prof. Orzel gives the impression of an everyday guy who just happens to have a vast but hidden knowledge of physics." (anonymous student evaluation comment)

The miscellaneous ramblings of a physicist at a small liberal arts college. Physics, politics, pop culture, and occasional conversations with his dog.

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SEPTEMBER 2, 2008

"Quantum Mechanics Is Magic": The Making of "Spin polarization and quantum statistical effects in ultracold ionizing collisions"

Category: **Academia** • **Lab Stories** • **MXP** • **My Lab** • **Physics** • **Science**

This was the last of the experiments that I did for my thesis (it's not the last xenon paper I'm an author on, but the work for that one was done while I was writing up), so my memories of it are bound up with the thesis-writing process.

My favorite story about this stuff was when I gave a talk about this work at NIST-- I don't recall if it was before or after my defense-- and somebody asked the obvious question about how the quantum statistical rules are enforced. That is, how is it that you never get two identical fermions colliding in an s-wave state? Since an s-wave collision is just a head-on collision, shouldn't there be some fermions somewhere in the sample that are headed straight at one another?

I shrugged, and said, "Quantum mechancis is magic." Then I went on to give the more serious explanation, namely that it's a mistake to think of the atoms as having definite positions and momenta within the sample, which is what you're doing when you imagine head-on collisions. Instead, you've got fuzzy probability clouds moving around, and you never find two fuzzy fermionic probability clouds in the s-wave configuration.

Then I turned to Bill Phillips, who had won a Nobel Prize by that point, and said "Anyway, that's how I think about it. How would you explain it."

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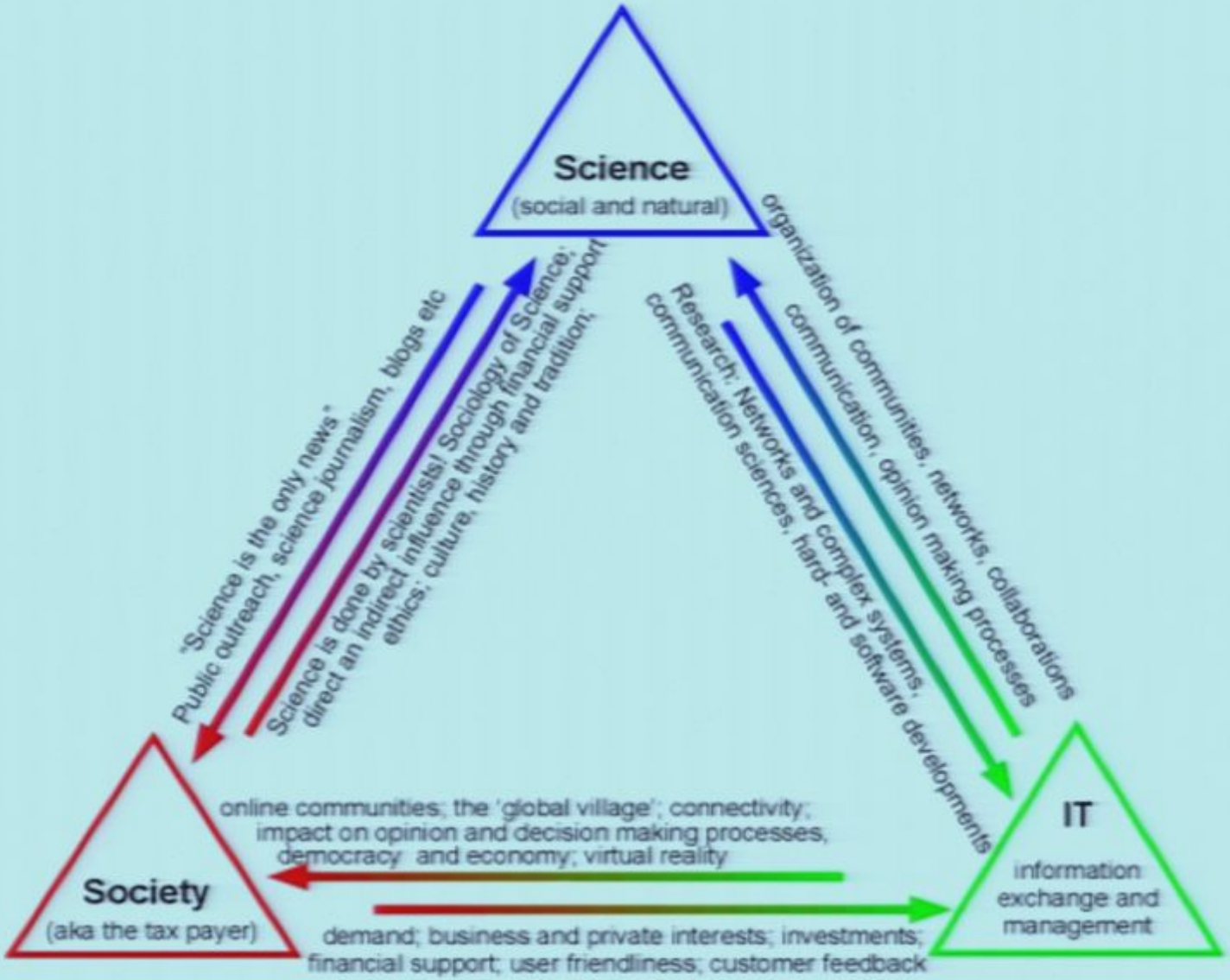
The Triangle



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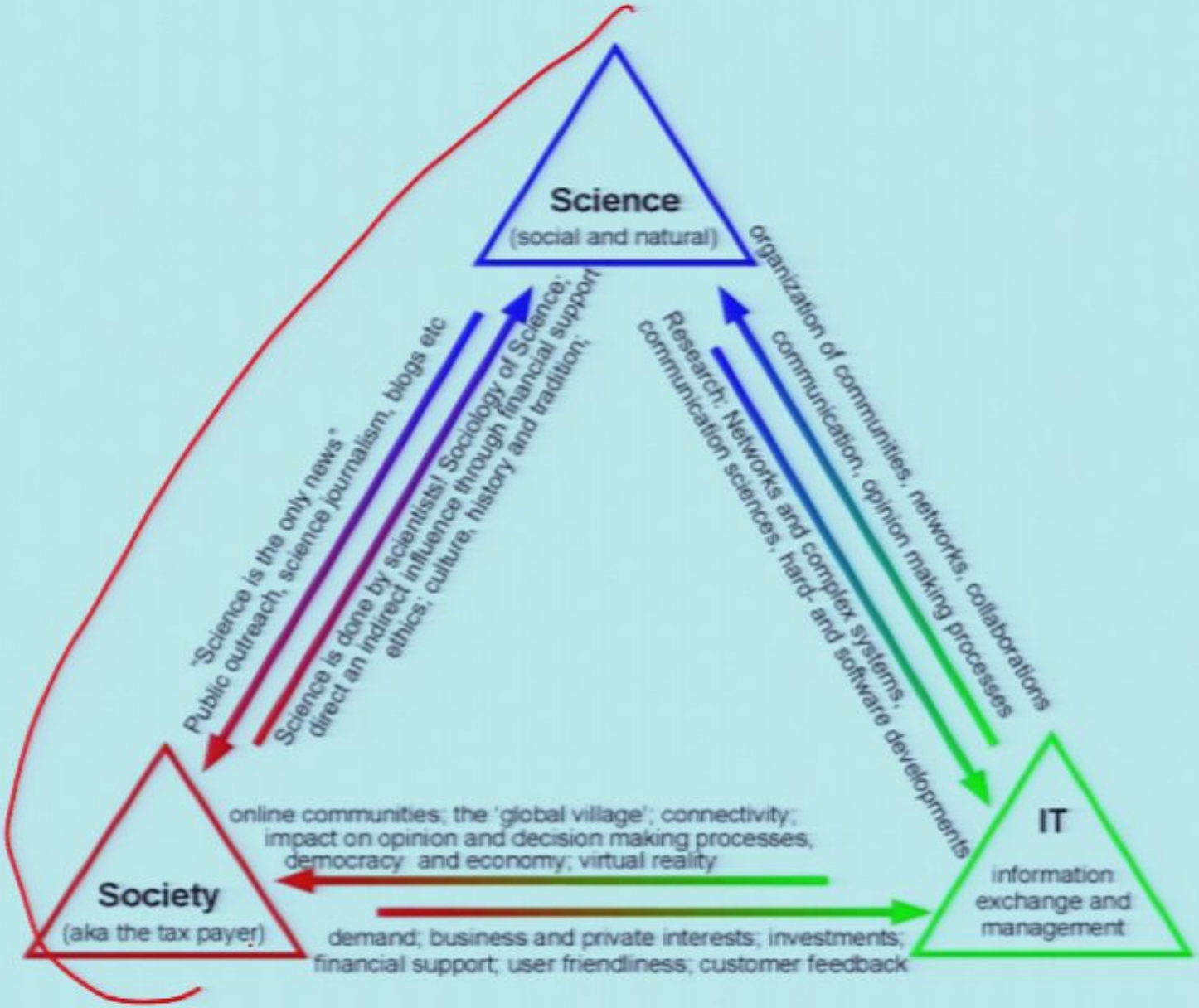

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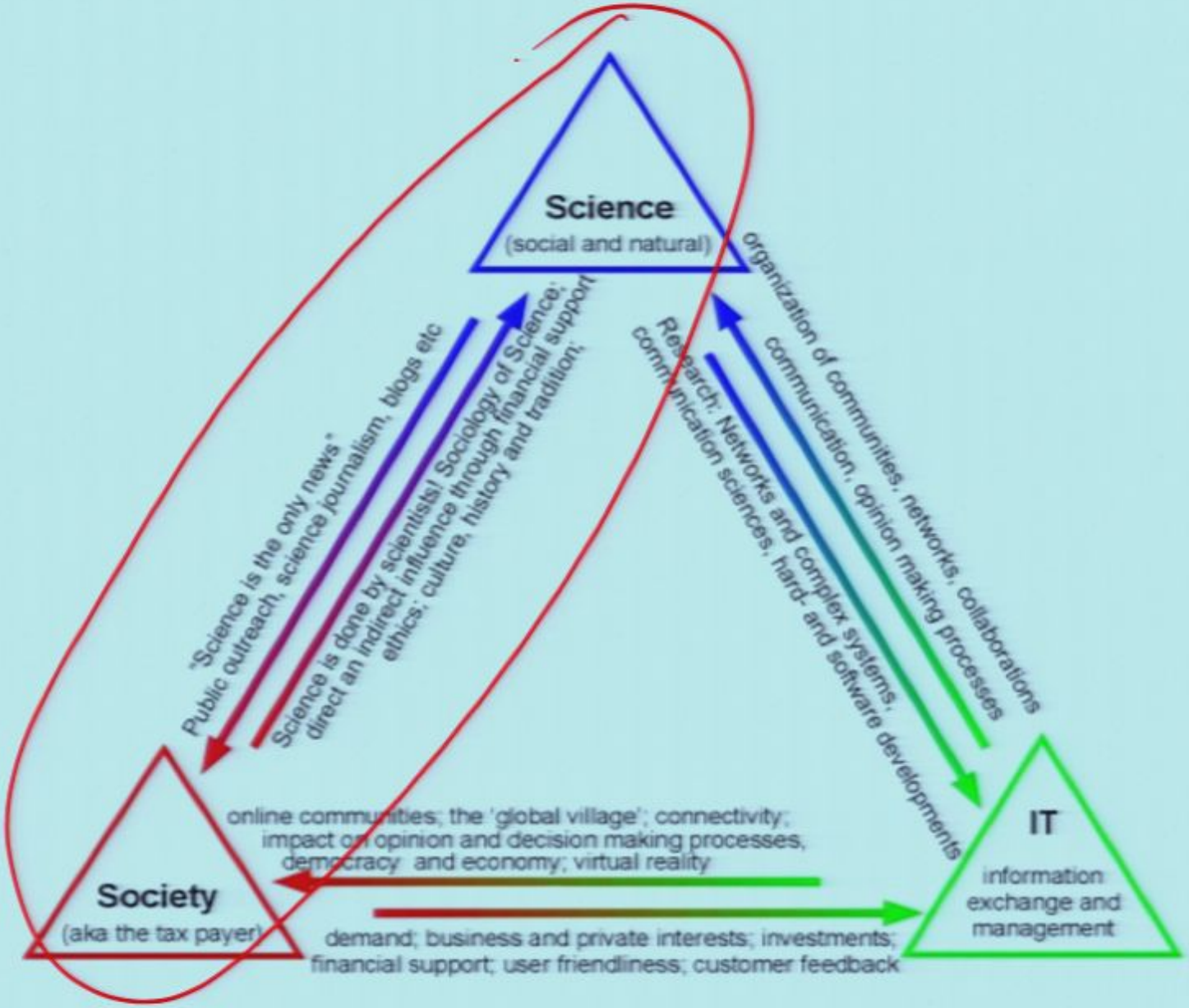

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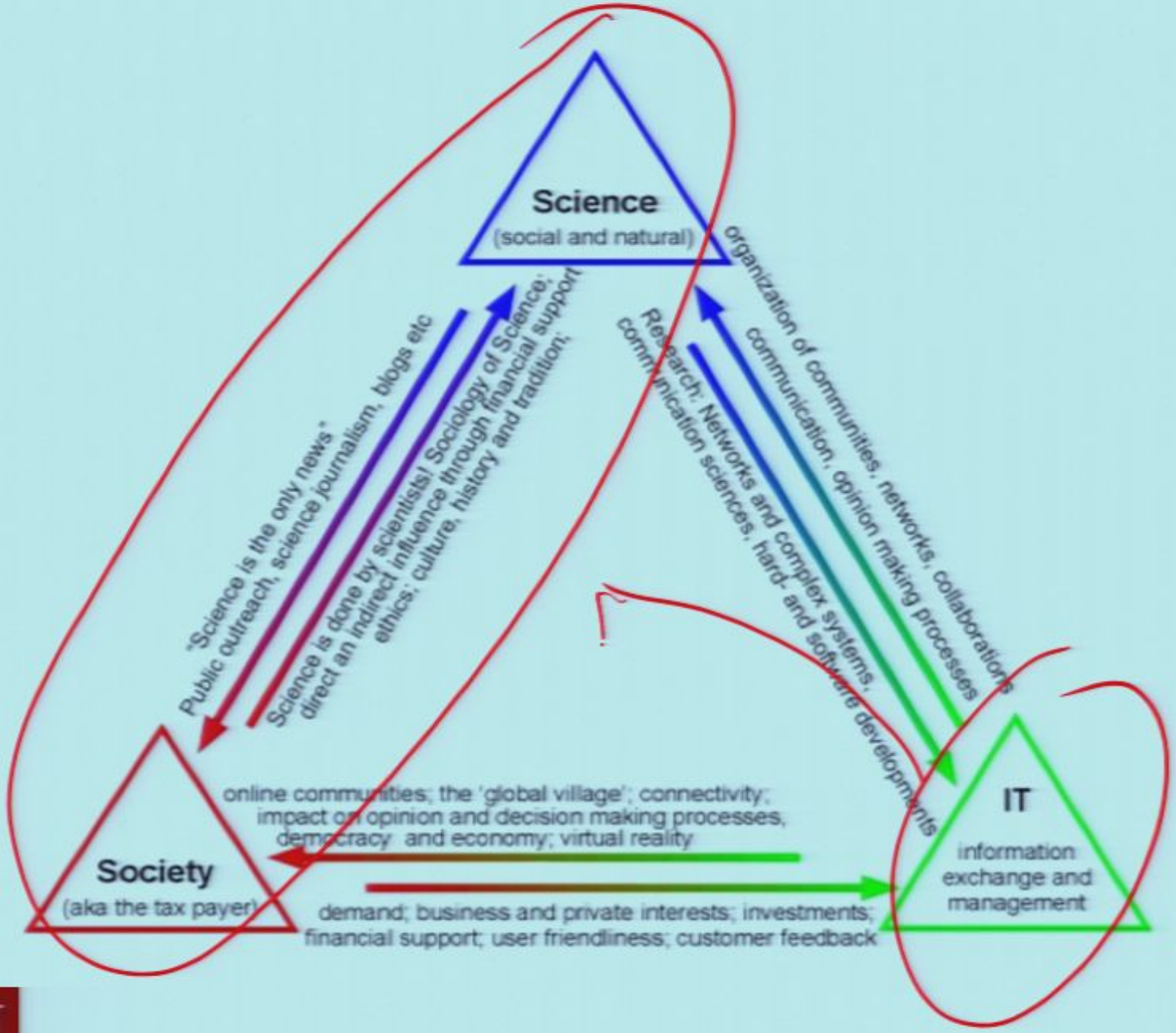

The Problem

Funding problems for science:

US FY08 Omnibus Budget Bill:

Fermilab funding cut to $320 milllion (expected $372M)

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Similar deep cuts in UK physics funding

Assigning Blame

Whose fault is it that funding was cut?

George Bush?

Iraq, Afghanistan, tax cuts used up all the money

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Democrats in Congress?

Grandstanding, message-sending

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My Claim:

We have failed at our job as scientists

What Is Science?

Science is a process for learning about the world:

1) Look at the world

Find some interesting phenomenon to explain

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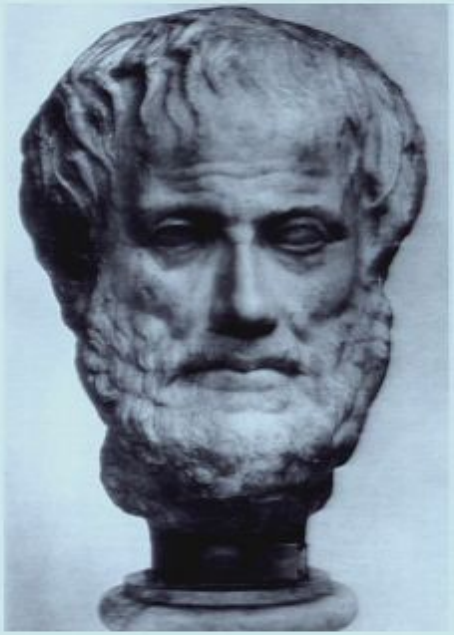

First two steps go back to antiquity

History

1) Look at the world

2) Make up a theory

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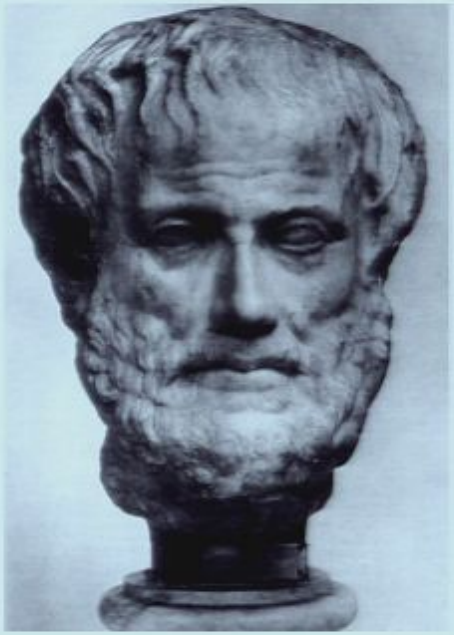

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Aristotle, Pythagoreans, etc.

Lots of nifty ideas, many totally wrong

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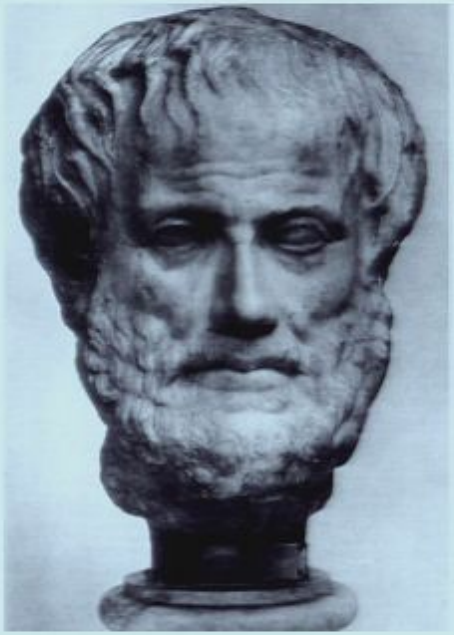

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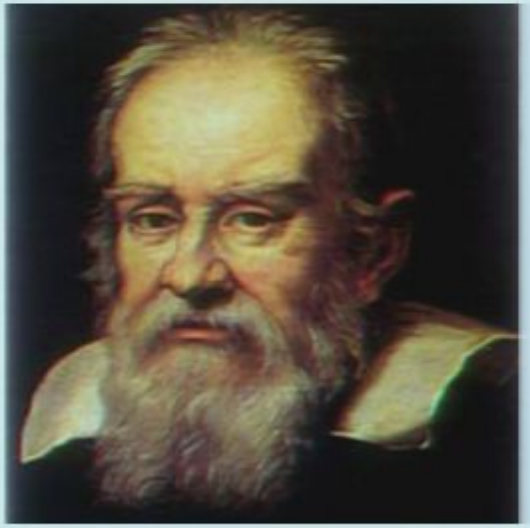

Step 3 becomes established in 1600's

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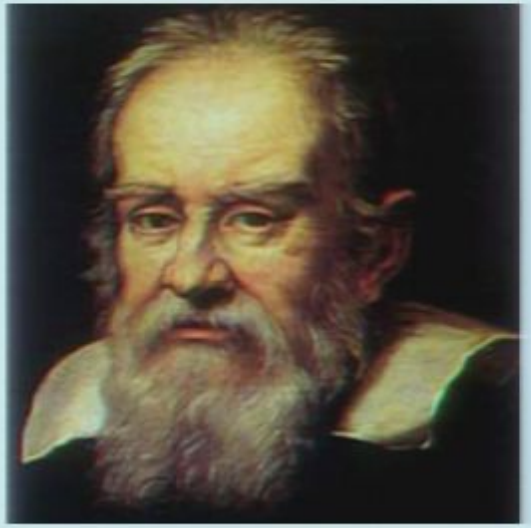

Step 3 becomes established in 1600's

Galileo Galilei (1564-1642)

Experiments allow you to distinguish between theories

Systematic study of mechanics, astronomy

(roughly contemporary developments in medicine, etc.)

History

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R. Hooke

Step 4: Surprisingly late catching on

Robert Hooke, 1676: "ceiiinosssssttuv"

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Step 4 separates science from alchemy

Stand on "shoulders of giants"

Models of Publication

Two models of approaching scientific communication:

(hat-tip: Robert Krulwich, WNYC Radiolab)

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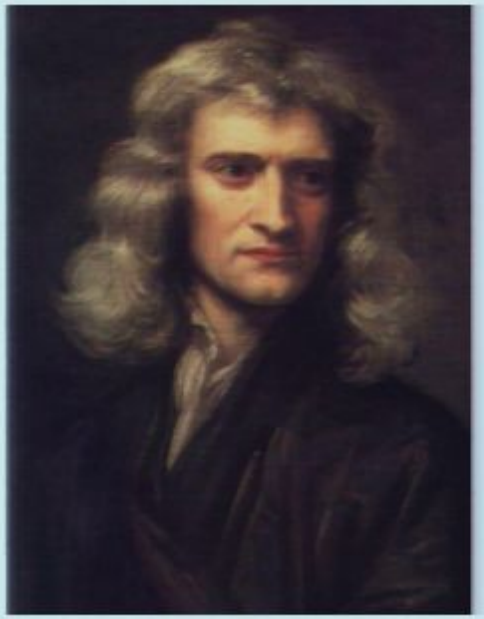

Sir Isaac Newton
(1642-1727)

UNION COLLEGE

(hat-tip: Robert Krulwich, WNYC Radiolab)

Models of Publication

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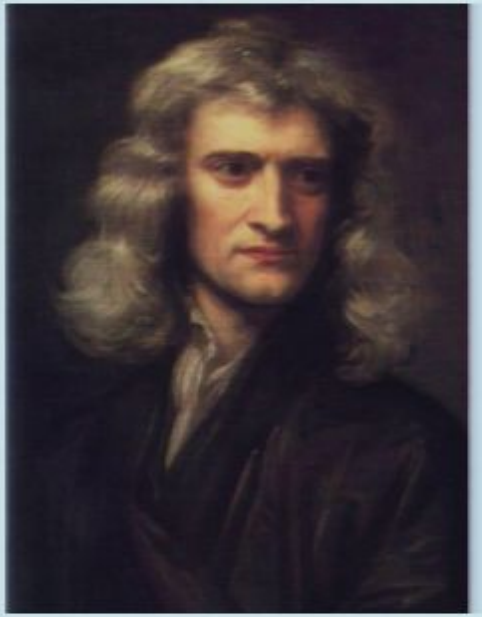
Newtonian Publication



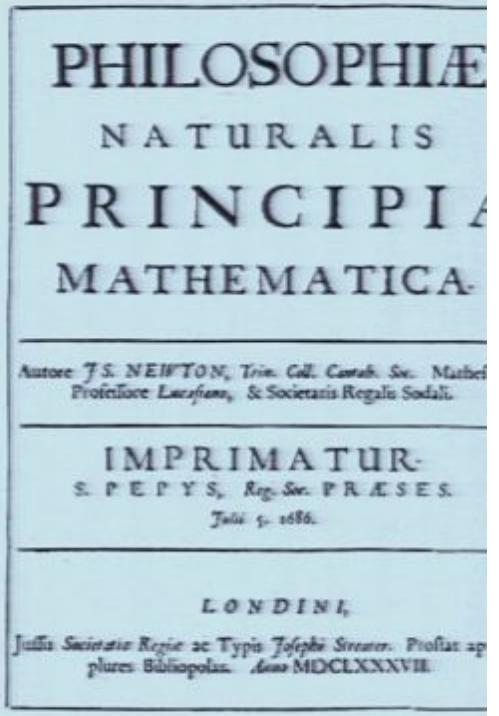
Most famous work:

Newtonian Publication

Most famous work:

Philosophiae Naturalis
Principia Mathematica

(published 1687)



PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA

Autore J.S. NEWTON, Trin. Coll. Cantab. Soc. Mathes
Professore Lucasiano, & Societatis Regalis Sodali.

IMPRIMATUR.
S. PEPYS, Reg. Soc. PRÆSES.
Julii 5. 1686.

LONDINI,
Justu Societatis Regiæ ac Typis Josephi Streater. Prostat ap
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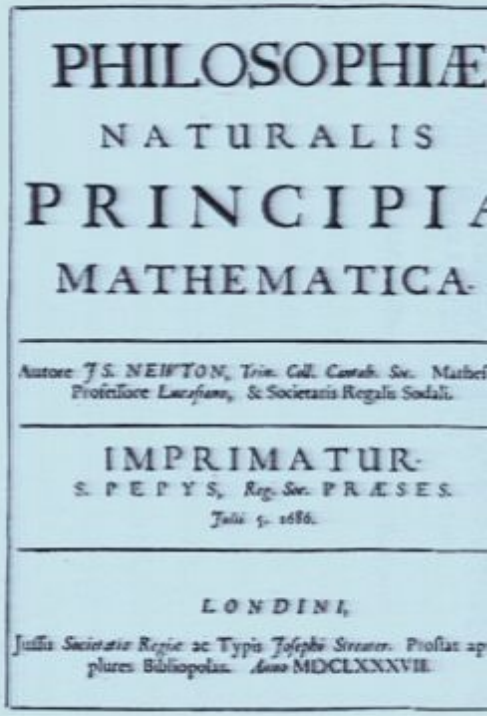

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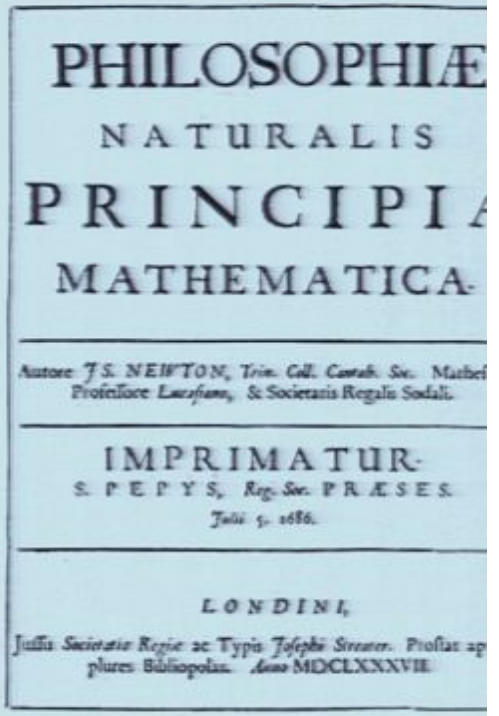

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Written in Latin, highly technical, highly mathematical

Deliberately difficult, "to avoid being baited by little smatterers in mathematicks"

Galileian Publication

Most famous work:

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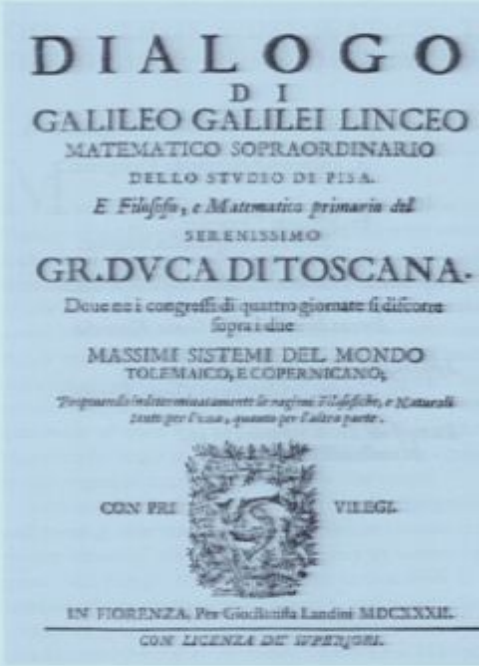
Dialogue Concerning the Two Chief World Systems

(published 1632)



DIALOGO
DI
GALILEO GALILEI LINCEO
MATEMATICO SOPRAORDINARIO
DELLO STVDIO DI PISA.
E Filosofo, e Matematico primario del
SERENISSIMO
GR. DVCA DI TOSCANA.
Doue ne i congressi di quattro giornate si discorre
sopra i due
MASSIMI SISTEMI DEL MONDO
TOLEMAICO, E COPERNICANO,
Proponendo indifferentemente le ragioni Filosofiche, e Naturali
tanto per l'vna, quanto per l'altra parte.
CON PRI VILEGI.
IN FIORENZA, Per Gio: Batista Landini MDCXXXII.
CON LICENZA DE' SVPERIORI.

Galileian Publication

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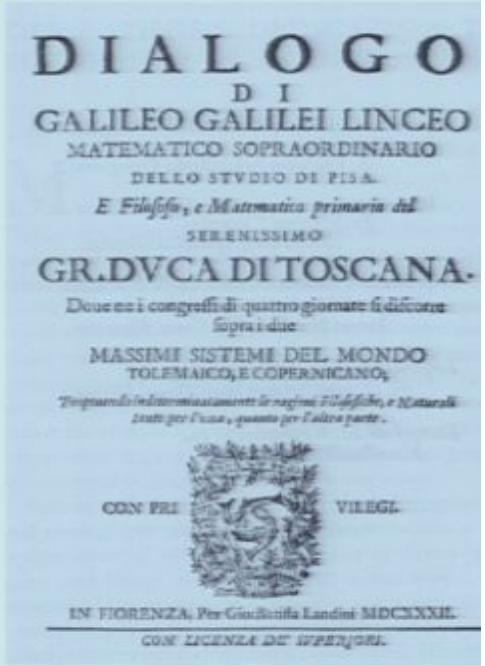

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CON LICENZA DE' SUPERIORI.

Written in vernacular, dialogue between three characters

Witty, accessible, highly readable, and persuasive

Banned, but widely read and influential

Results

Outcomes of different publication models:

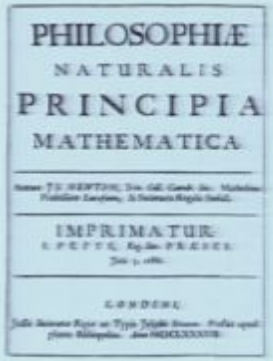
Newton

Galileo:

Results

Outcomes of different publication models:

Newton



Galileo:

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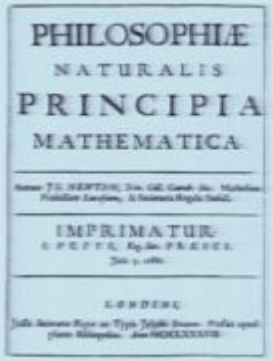

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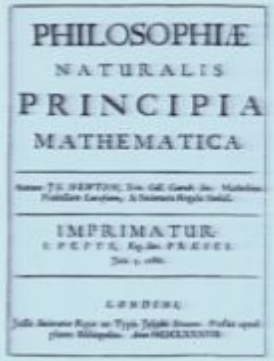

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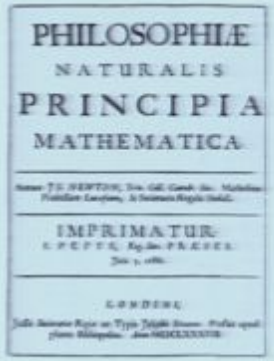

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Galileo:

The Inquisition

Results

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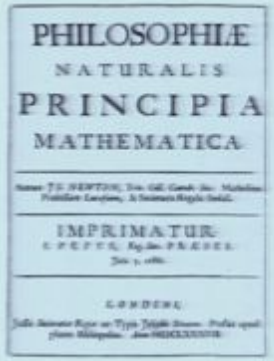


Master of the Mint

Galileo:

The Inquisition

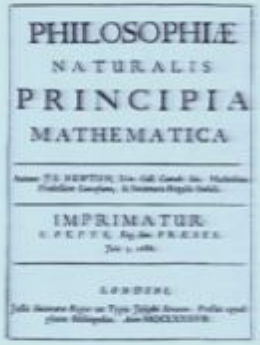
Lesson of History:

Newtonian Publication Is Better For Your Career

Newton Lives

Same pattern still holds today

Newtonian publication preferred



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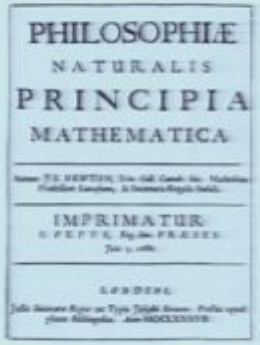

Hiring, promotion, prestige depend on technical publications aimed at a narrow audience of other scientists

Science, not *Scientific American*

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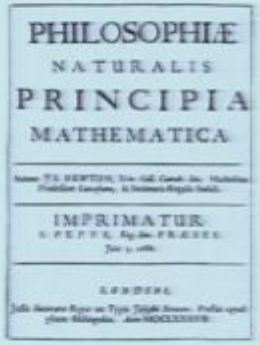
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LONDINI

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Hiring, promotion, prestige depend on technical publications aimed at a narrow audience of other scientists

Science, not *Scientific American*

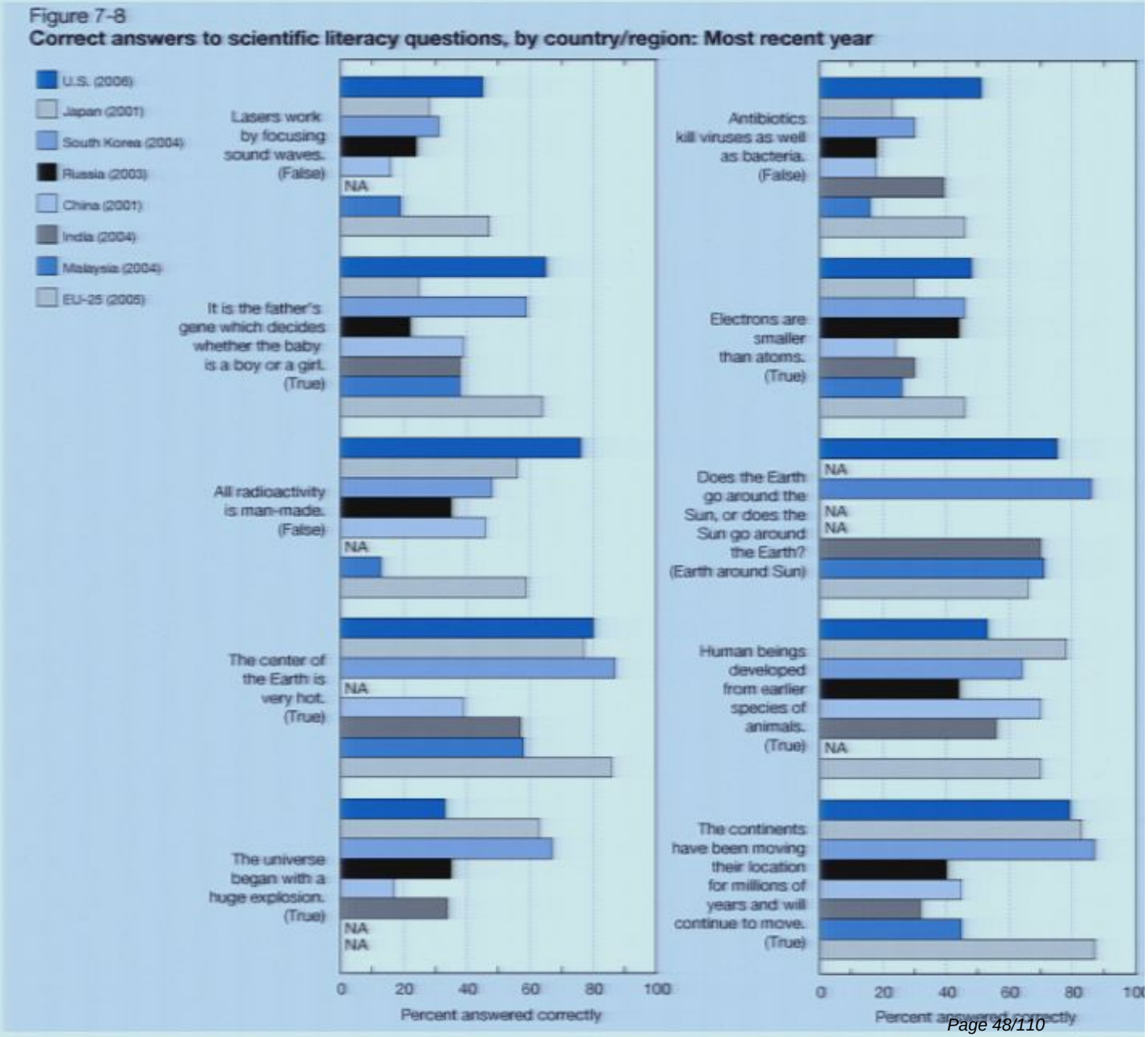
Galileian publication discounted or ignored

Even pedagogical research doesn't fully "count"

Public Knowledge

What's the problem?

Science literacy among public is depressingly bad



NSF Science and Engineering Indicators, 2008

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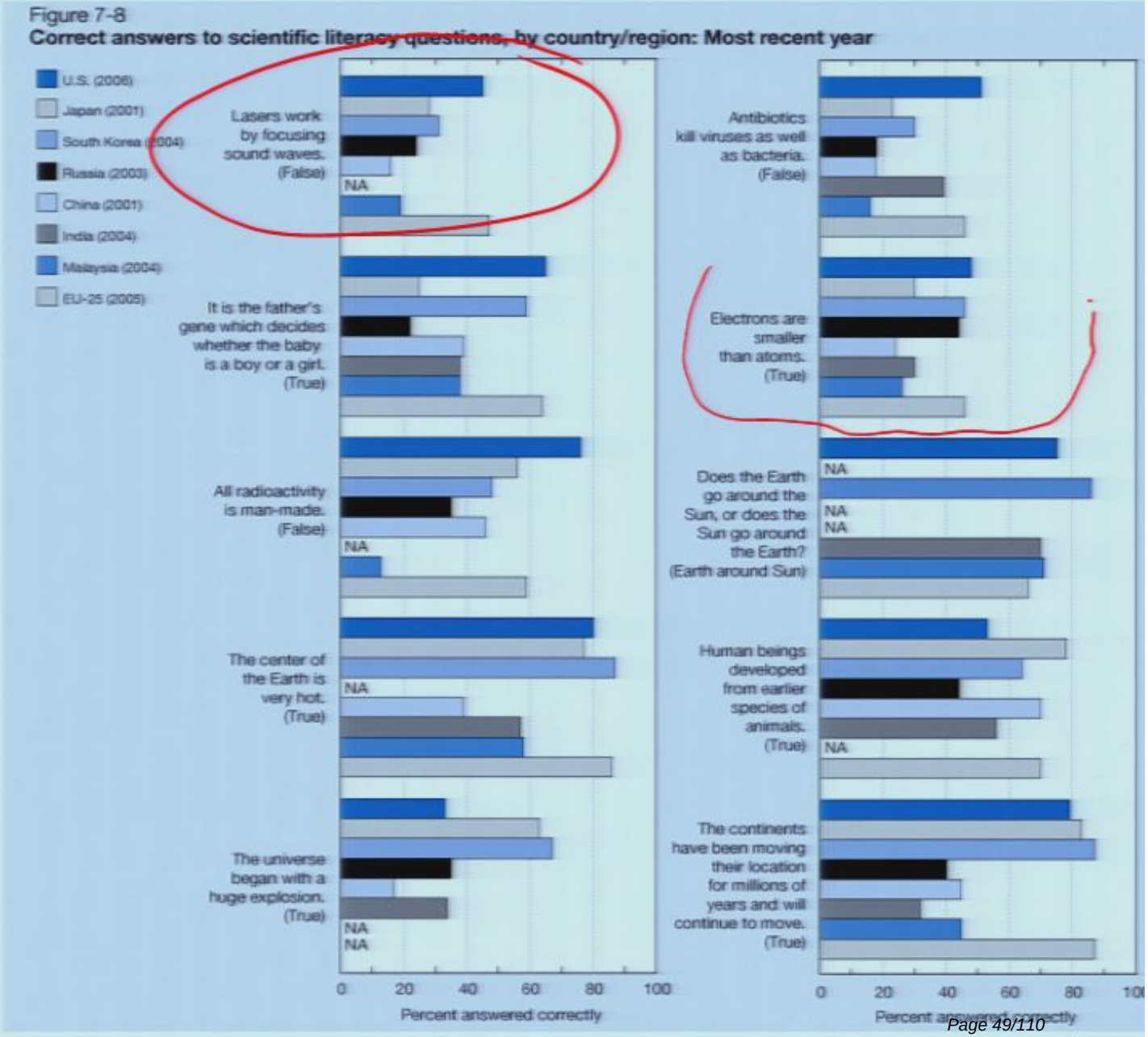

NSF Science and Engineering Indicators, 2008

Public Knowledge

What's the problem?

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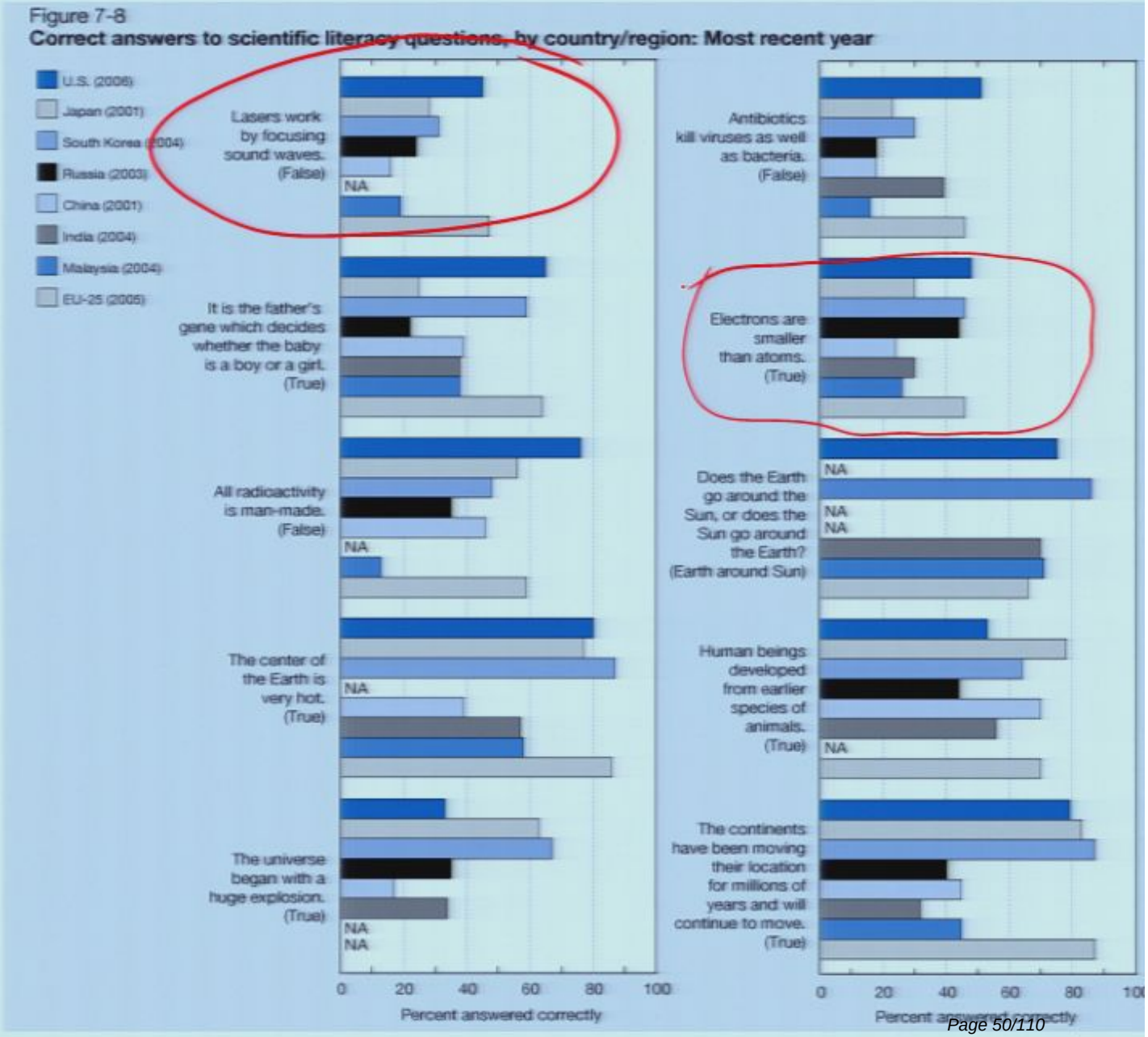
(Note: Not just a US problem)



NSF Science and Engineering Indicators, 2008

Public Attitudes

The general public likes science…

87% support Federal funding

41% favor spending more

(ahead of defense, space, foreign aid)

87% interested in new discoveries

47% "a lot" of interest

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47% "a lot" of interest

… when they notice it.

only 15% follow science news "very closely"

10th place– sports gets 23%, religion 16%

(NSF Science & Engineering indicators 2008)

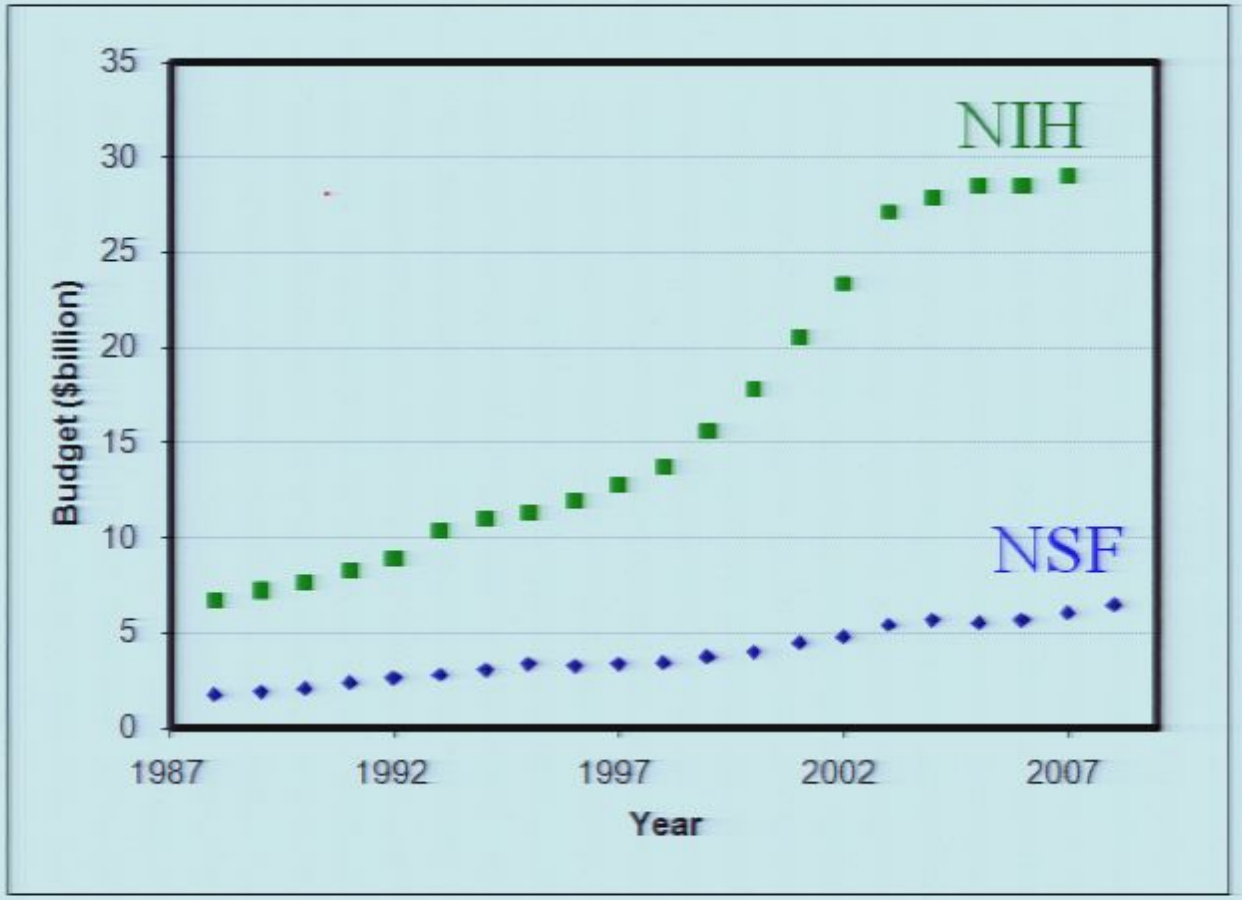
Funding Consequences

Public favors funding, but not a priority

➔Instability

Feast or Famine

Lots of money for "crises," then lose interest



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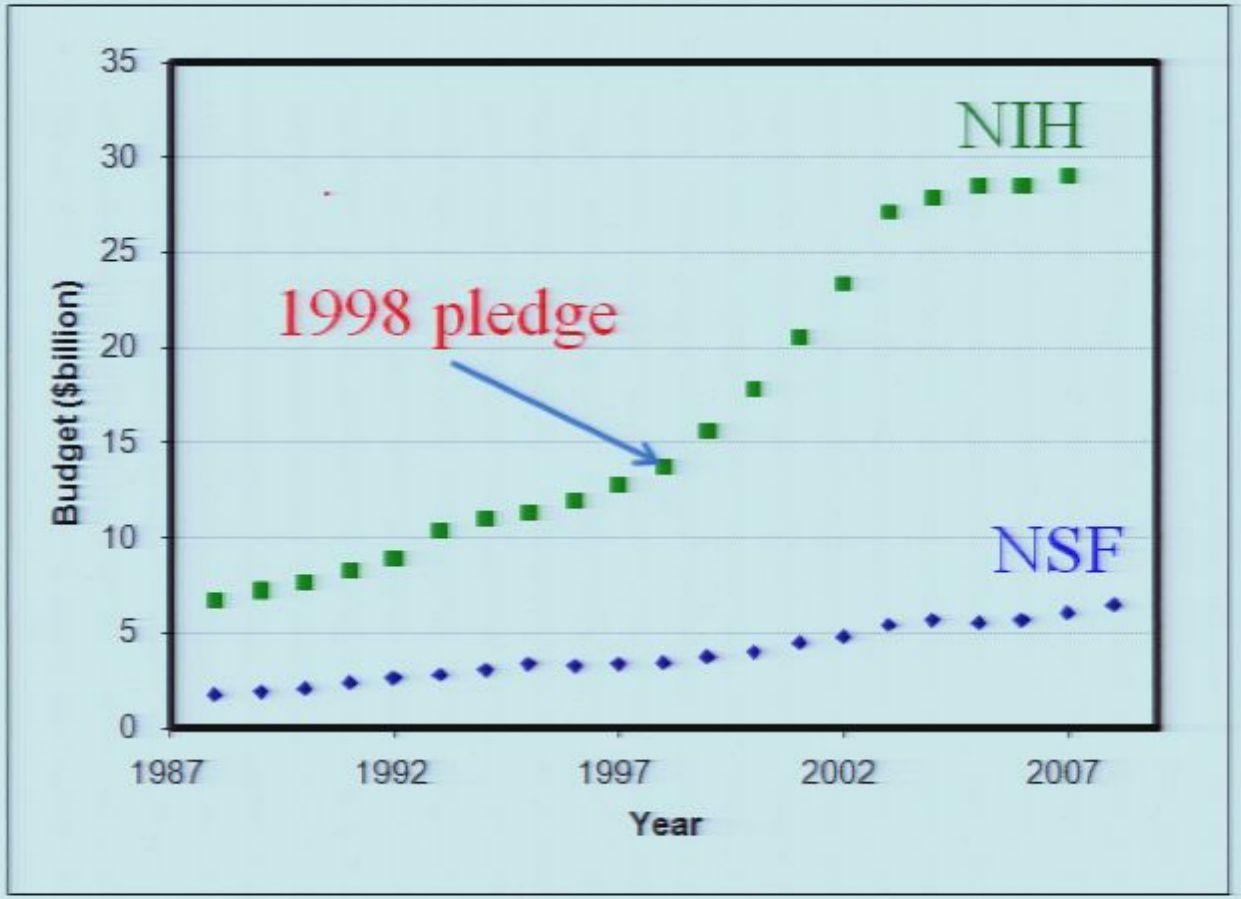
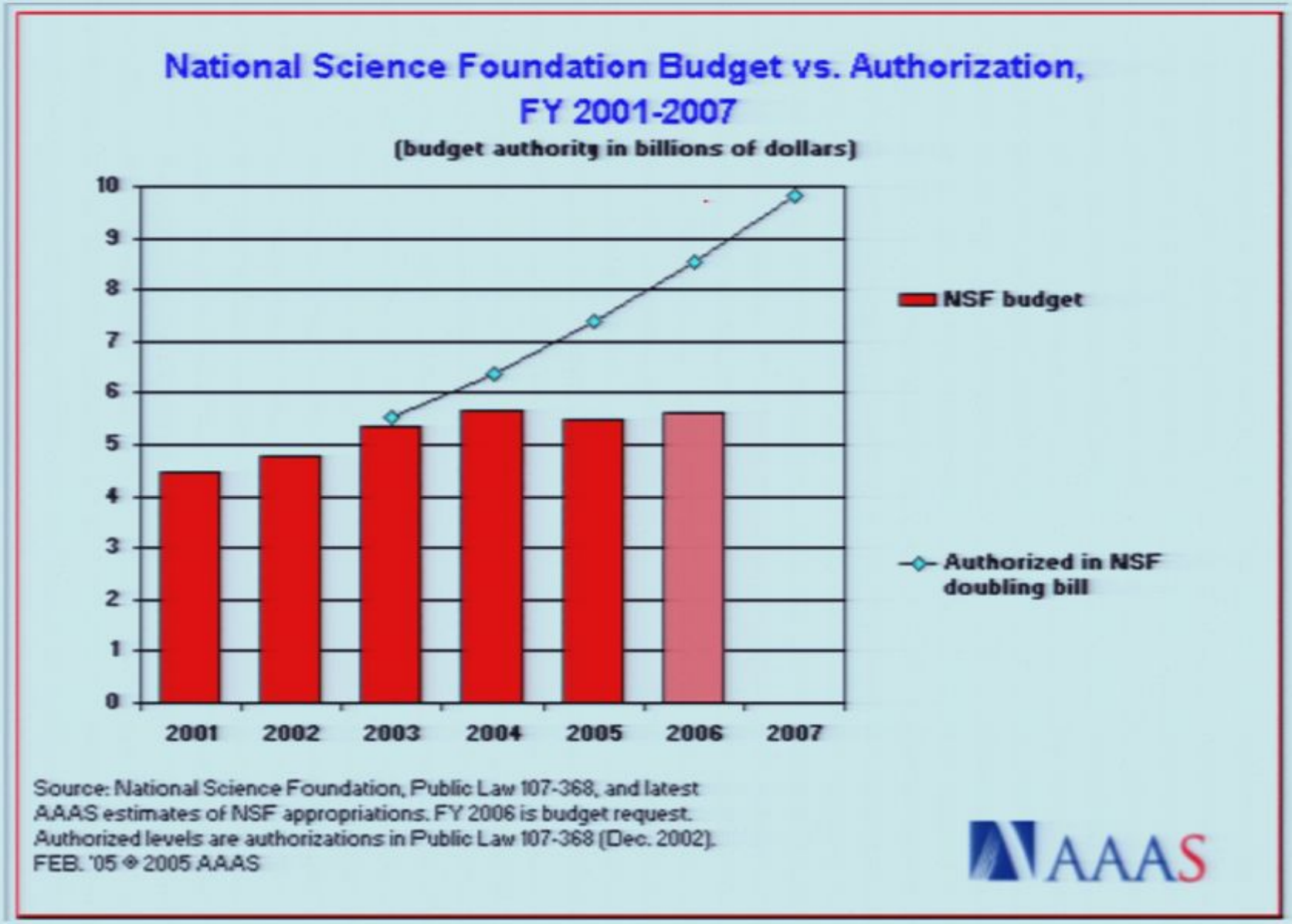


Clinton pledge to double NIH budget in 1998, then flat

Funding Consequences



2008 Funding Cuts

Why did Congress slash high-energy physics funding in 2008?

2008 Funding Cuts

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No follow-through in November (expected)

What to Do?

Public knowledge and appreciation of science are not very good

As scientists, we need to do a better job

Engage public interest

Create a constituency for science

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NY08 World Science Festival

Café Scientifique

Find a Cafe | How it Works | News | In the Media | Start a Cafe | Sponsors | Links | Events

UNION COLLEGE

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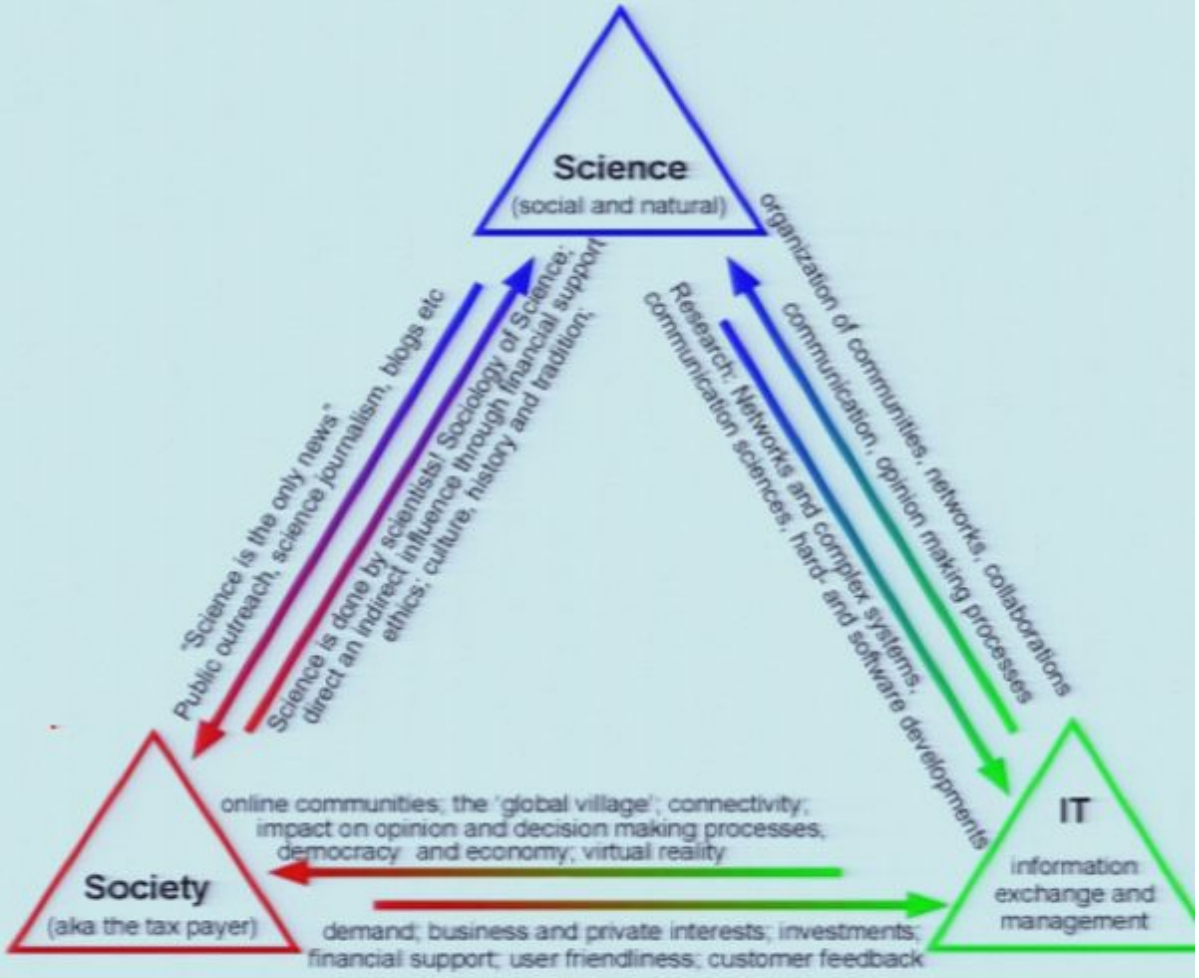
Encourage Galileos, don't force them to be Newtons

What Does This Have to Do With Anything?

New communications tools



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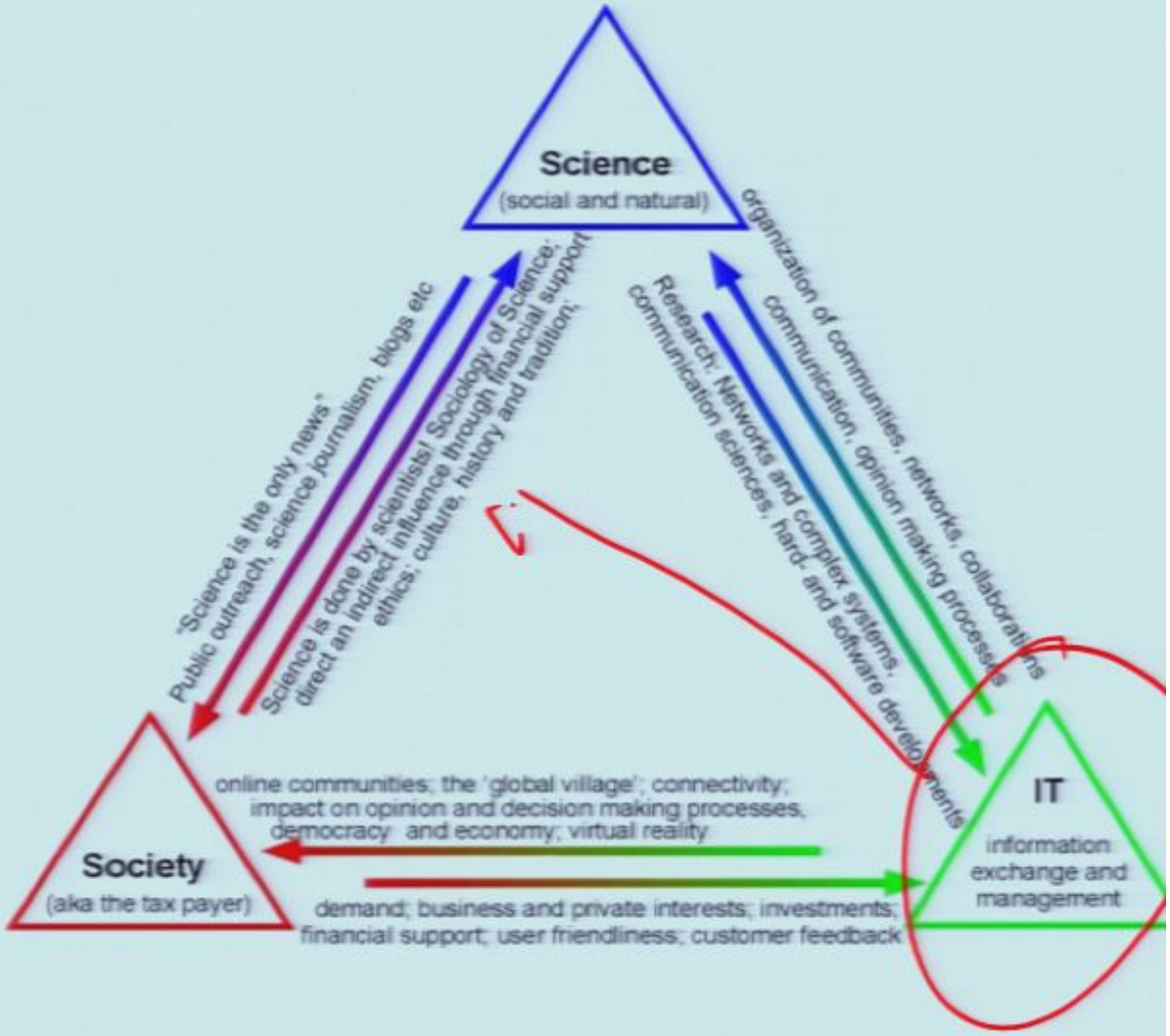

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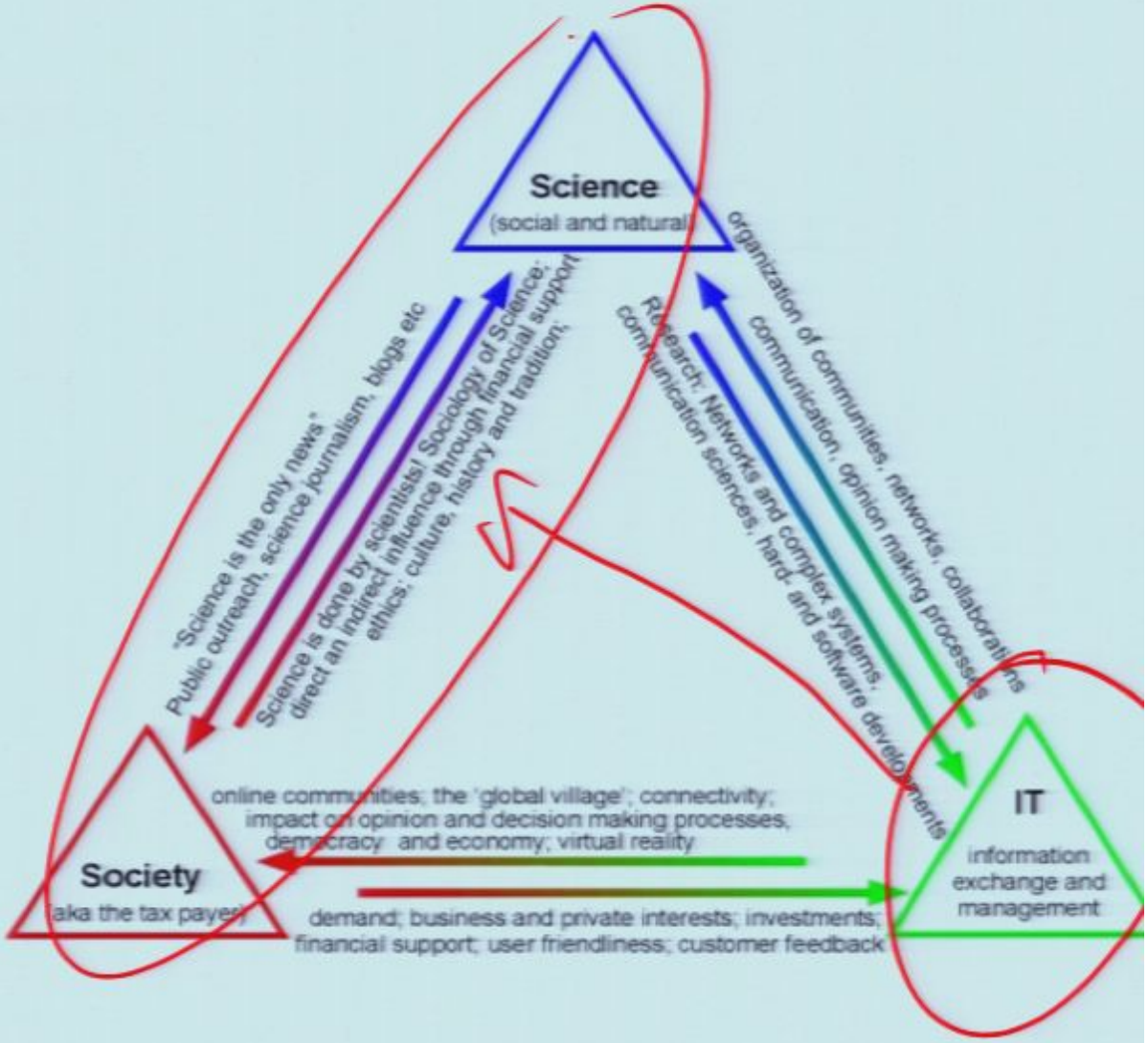

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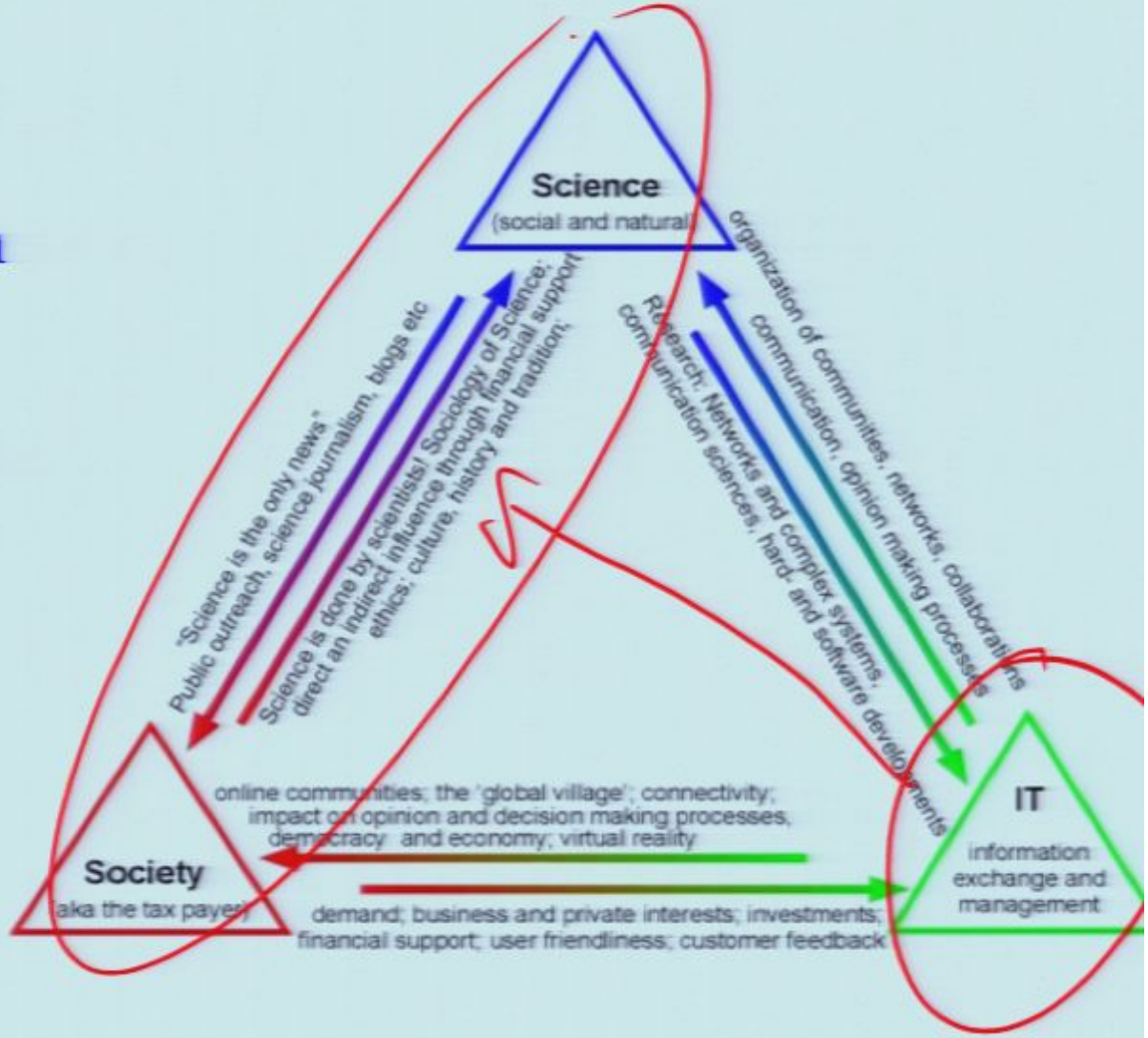
Enable scientists to reach a global audience

Make outreach easy and (relatively) painless



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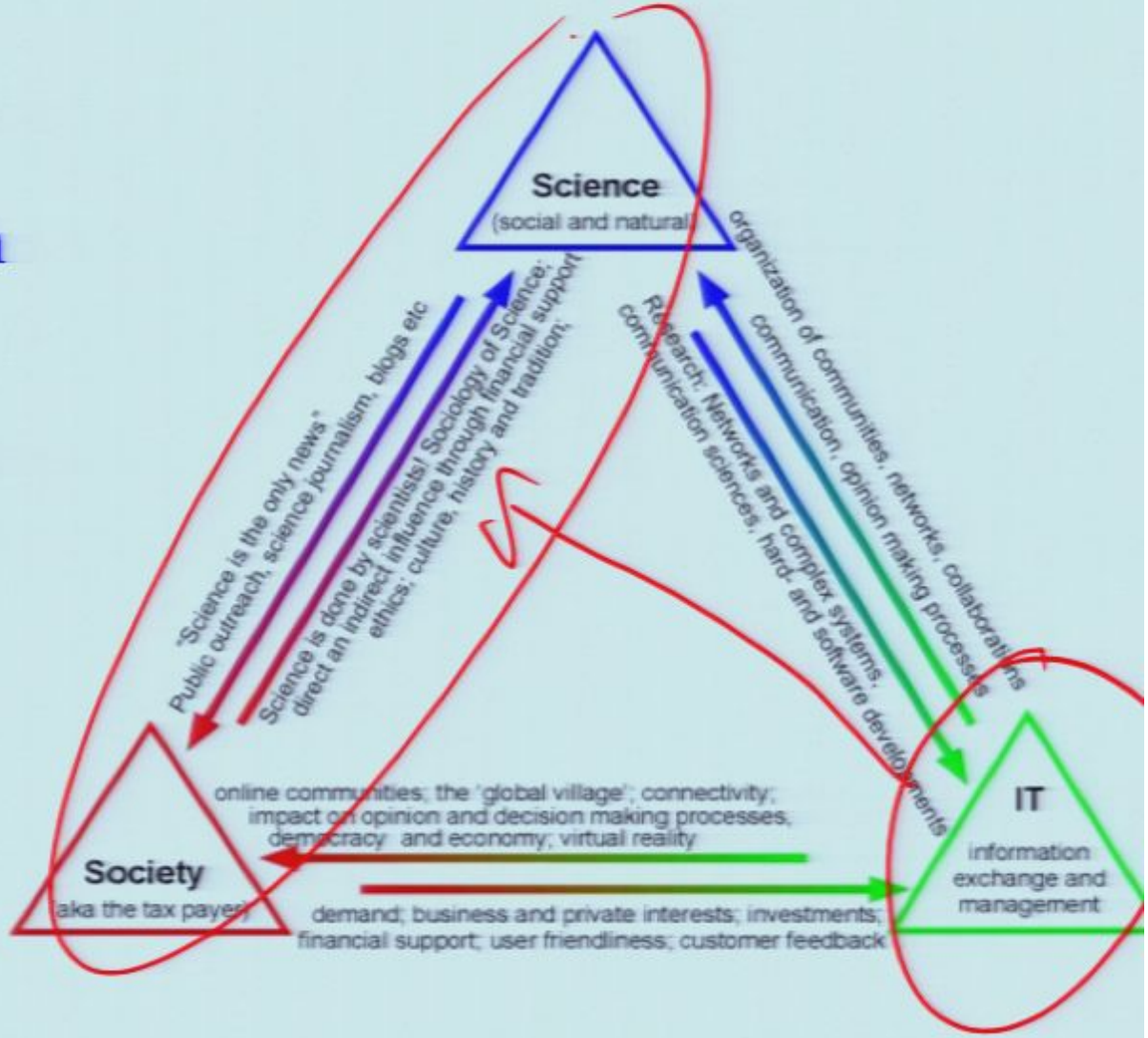
➔ Weblogs as a tool for public outreach



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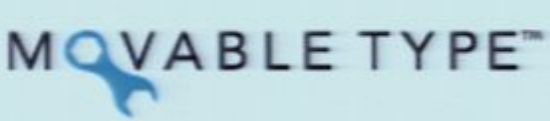

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Also blogs about science…

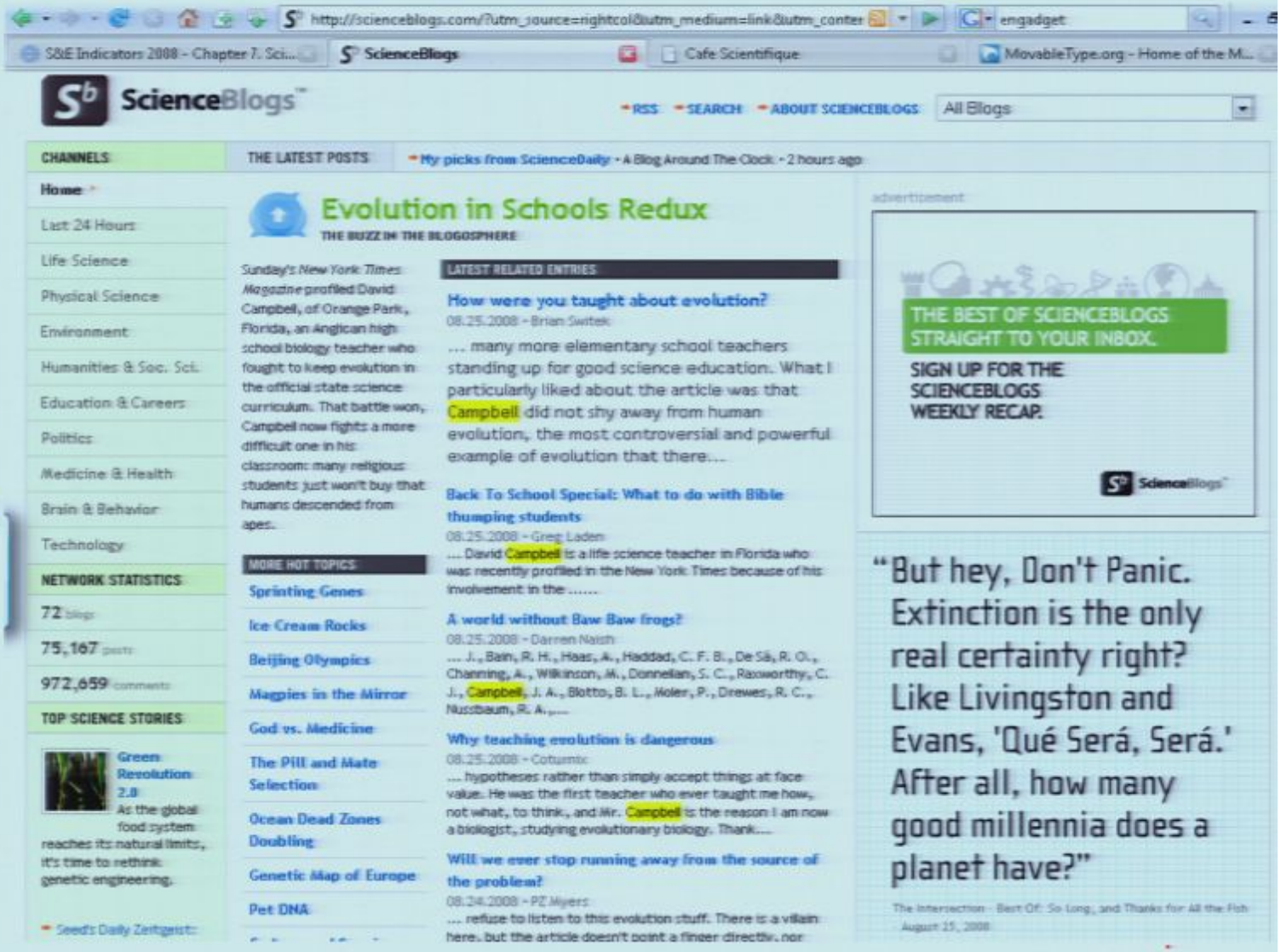
Science Blogs

Sponsored by Seed Media Group

~70 blogs

~6 million views/month

All areas of science



http://scienceblogs.com/

Uncertain Principles

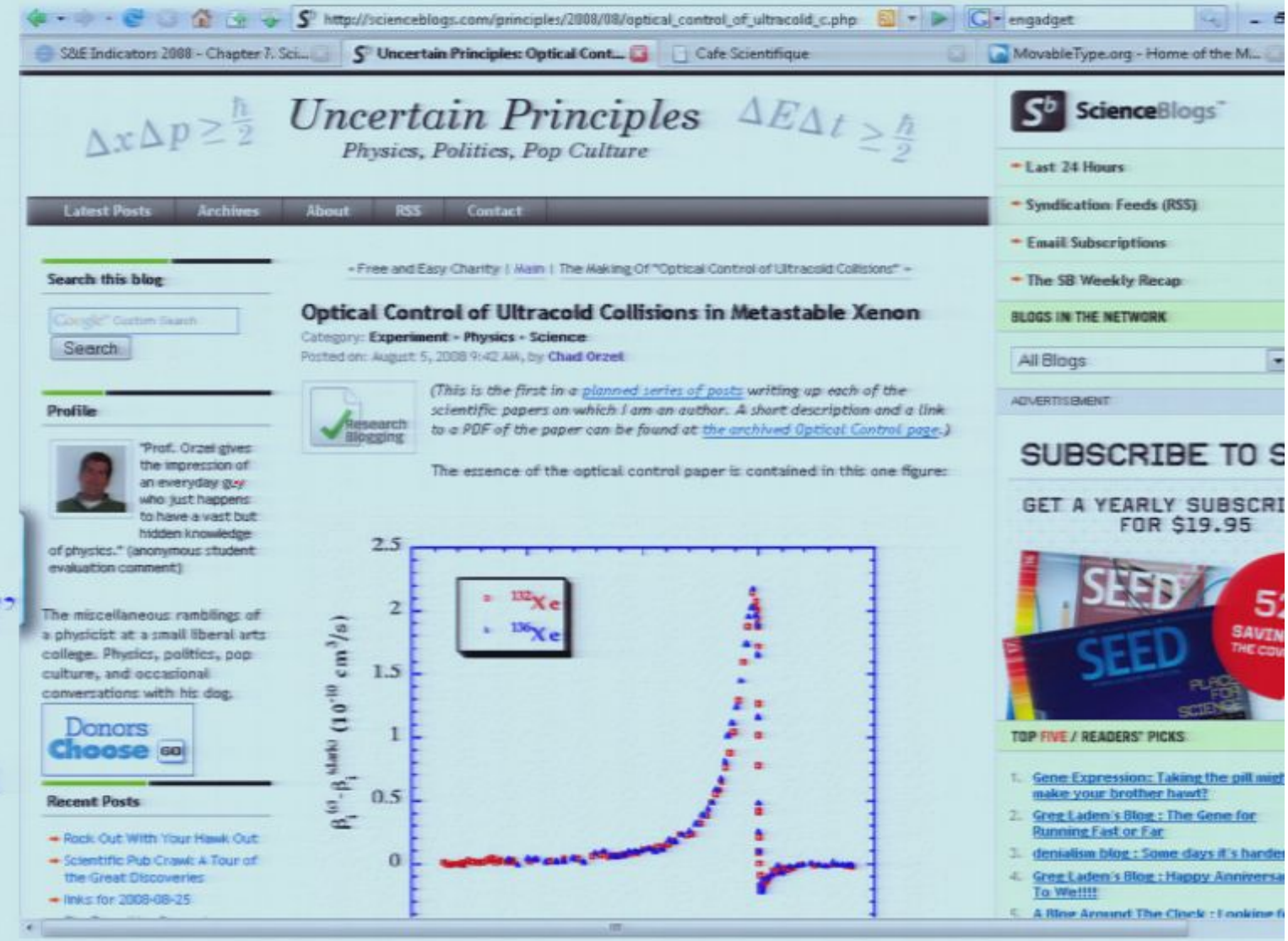
My personal blog

started 2002

moved to SB in 2006

"Physics, Politics, Pop Culture"

~60,000 visits/month



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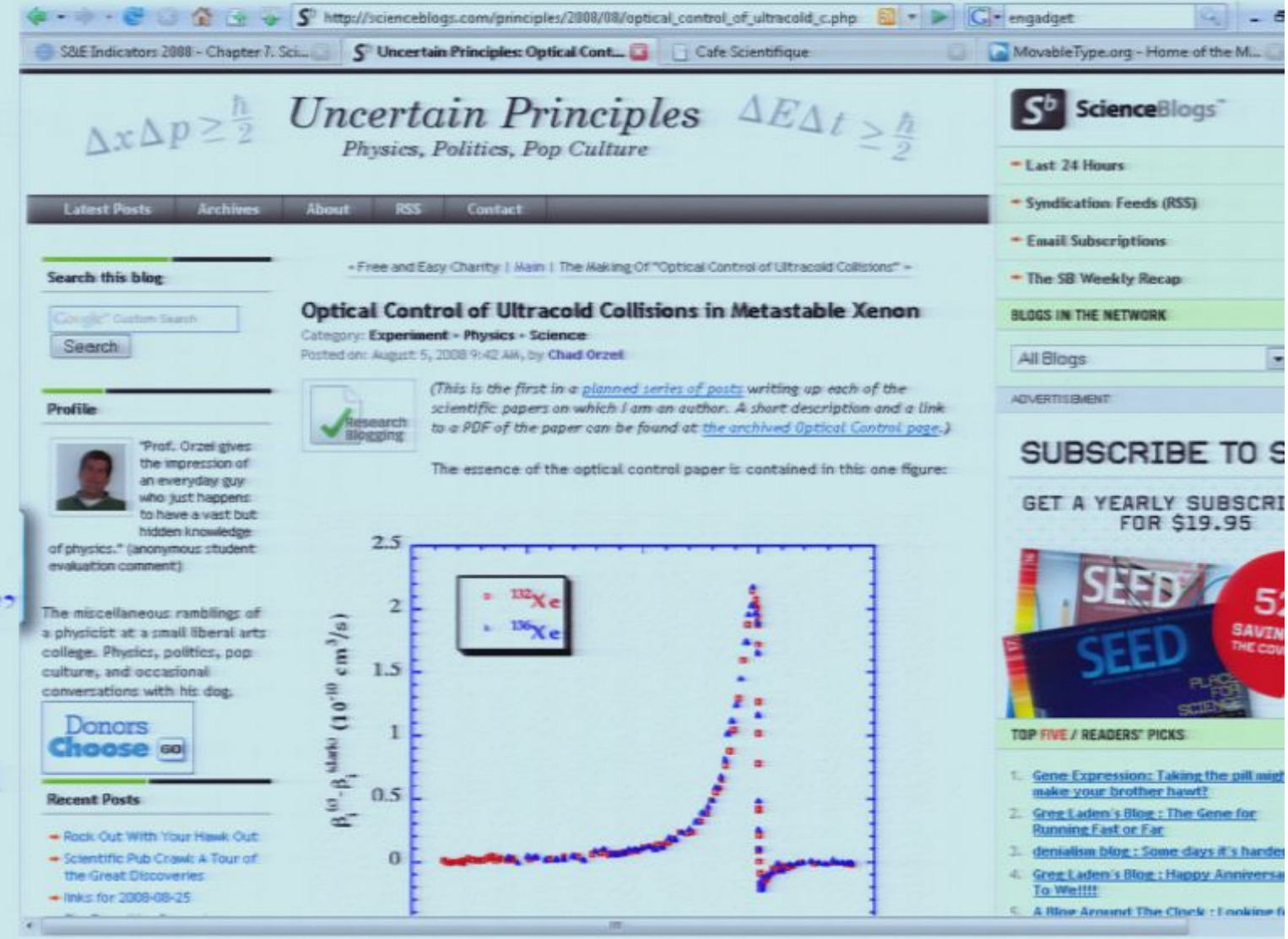

Next
Previous
Last Viewed
Go to Slide
Custom Show
Screen
Help
Pause
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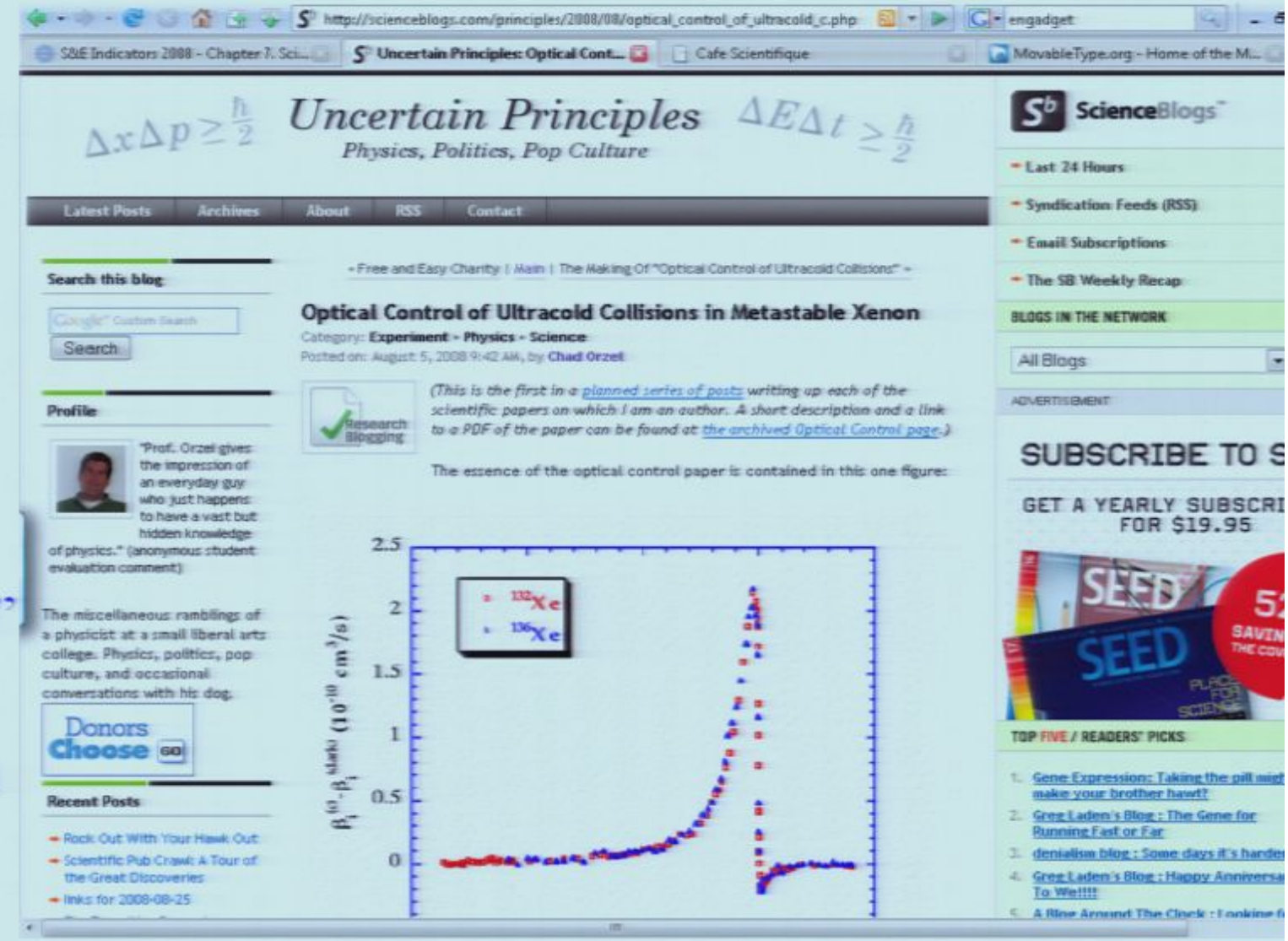

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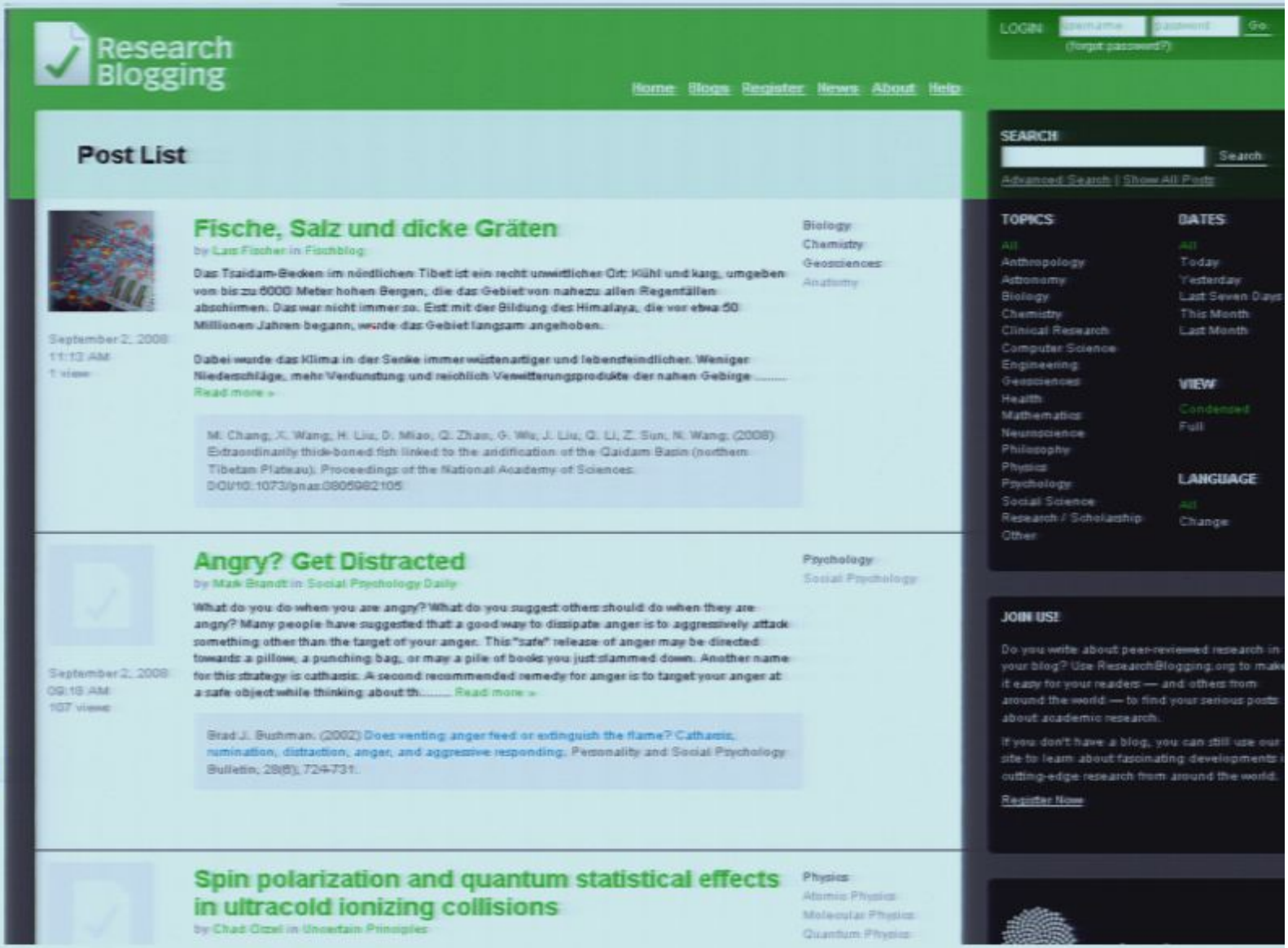
Research Blogging

Aggregates posts about peer-reviewed articles

~400 blogs

~15 posts/day

~300,000 views/month



http://www.researchblogging.org/

Basic Concepts

Posts written for very general audience covering most essential elements of various fields

Collected by John Wilkins

Search this blog

Search

Profile

John Wilkins is an aged, eternal student, who thinks philosophy of biology is **at least** as interesting as politics or sport and twice as important. He has a PhD from the University of Melbourne and a position as a ~~Postdoctoral Fellow~~ Sessional Lecturer at the University of Queensland, in Australia. After a varied career, involving factories, gardening, civil service, publishing, graphics, public relations but not, unfortunately for the CV, driving a truck, John finally completed his thesis on species concepts in 2004, which he has worked into two books. *Species Definitions: A Sourcebook* (Peter Lang) will come out in 2008; *Species: A History of an Idea*

« Basic Concepts: Medicine, Psychology and Psychiatry | Main | Basic Concepts: Biology »

Basic Concepts: Physics and Astronomy, Geology, and Chemistry

Category: **Basic Concepts**
Posted on: August 21, 2008 8:50 AM, by **John S. Wilkins**

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Physics and Astronomy

- Energy by Chad Orzel at *Uncertain Principles*
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UNION COLLEGE

http://scienceblogs.com/evolvingthoughts/2008/08/basic_concepts_in_science_a_li.php

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Checking Facts

Another useful service:

BAD ASTRONOMY

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RESPECTFUL INSOLENCE

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Can't prevent posting of distorted science, but can provide correct information for the public

Humanizing of Scientists

An underrated effect of science blogs:

Baby and pet pictures

TV, Books, Movies

Art and Music

Polls, "memes," etc.

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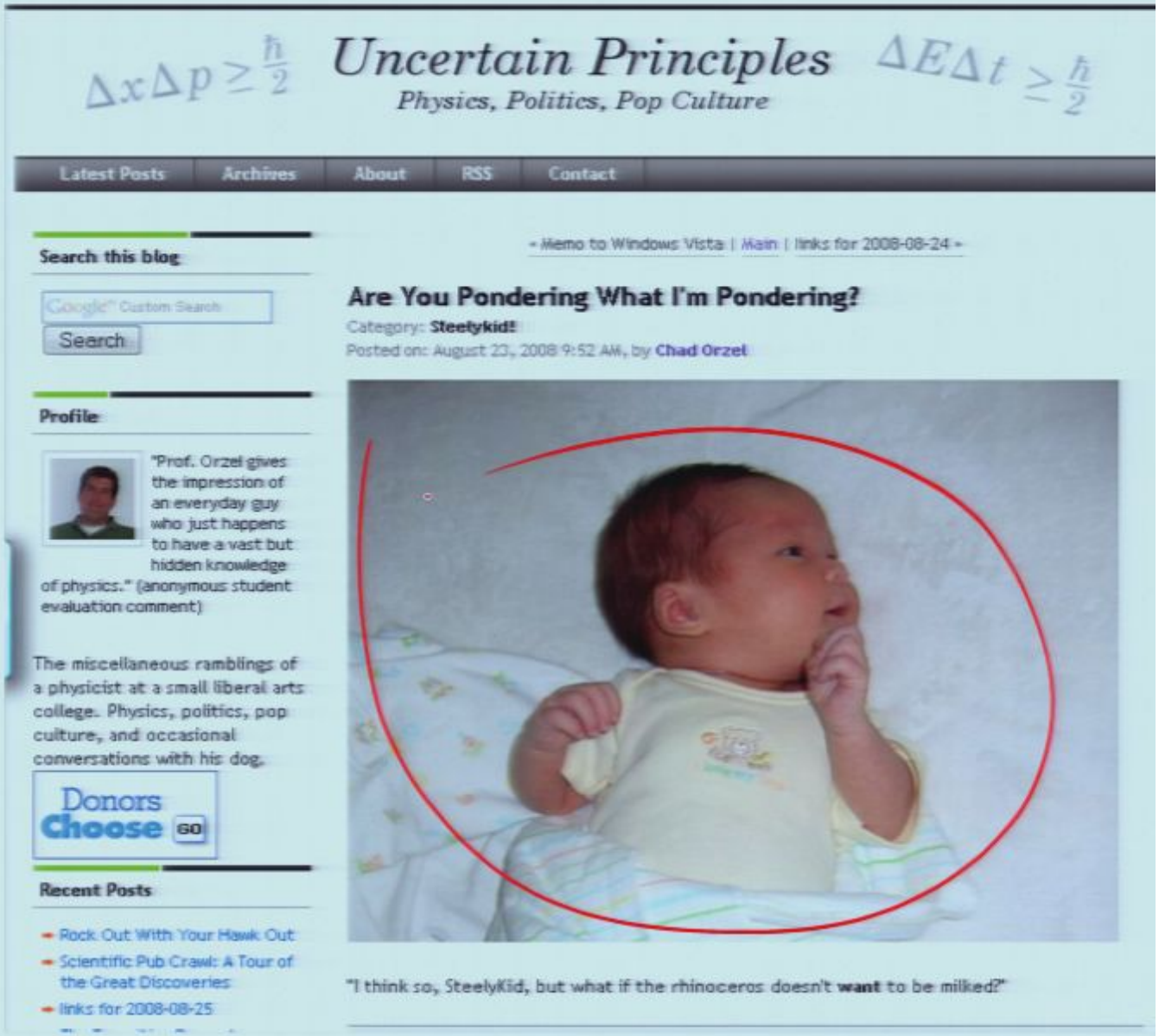
Scientists are people, contrary to myth



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Advantages of blogging as a communications tool:

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Springboard for future Galileians…

What About the Dog?

January, 2007:

"Bunnies Made of Cheese"

Imaginary conversation about QED

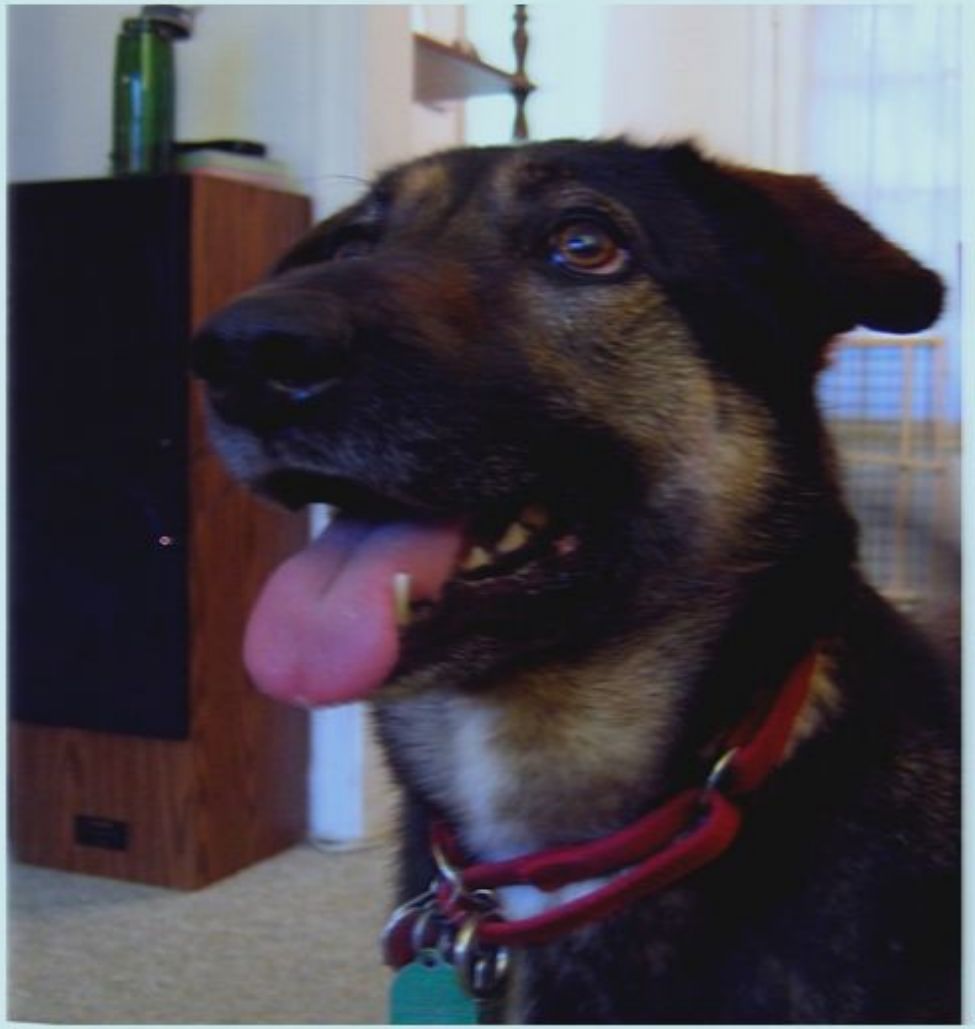
The dog is standing at the window, wagging her tail excitedly. I look outside, and the backyard is empty.

"What are you looking at?" I ask.

"Bunnies made of cheese!," she says. I look again, and the yard is still empty.

Dramatic Reading:

(CNET Buzz Podcast, ~2min)



Emmy, Queen of Niskayuna

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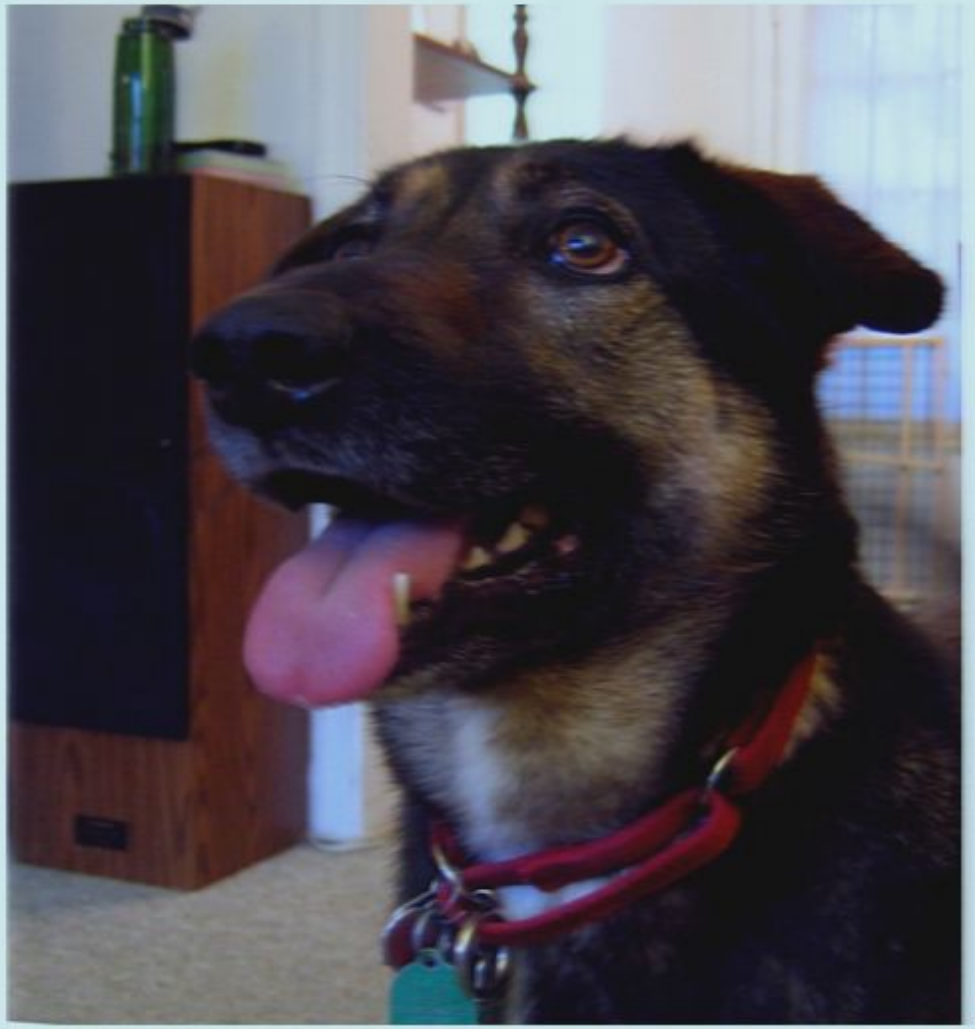

Emmy, Queen of Niskayuna

Arrow
Ballpoint Pen
Felt Tip Pen
Highlighter
Ink Color
Eraser
Erase All Ink on Slide
Arrow Options

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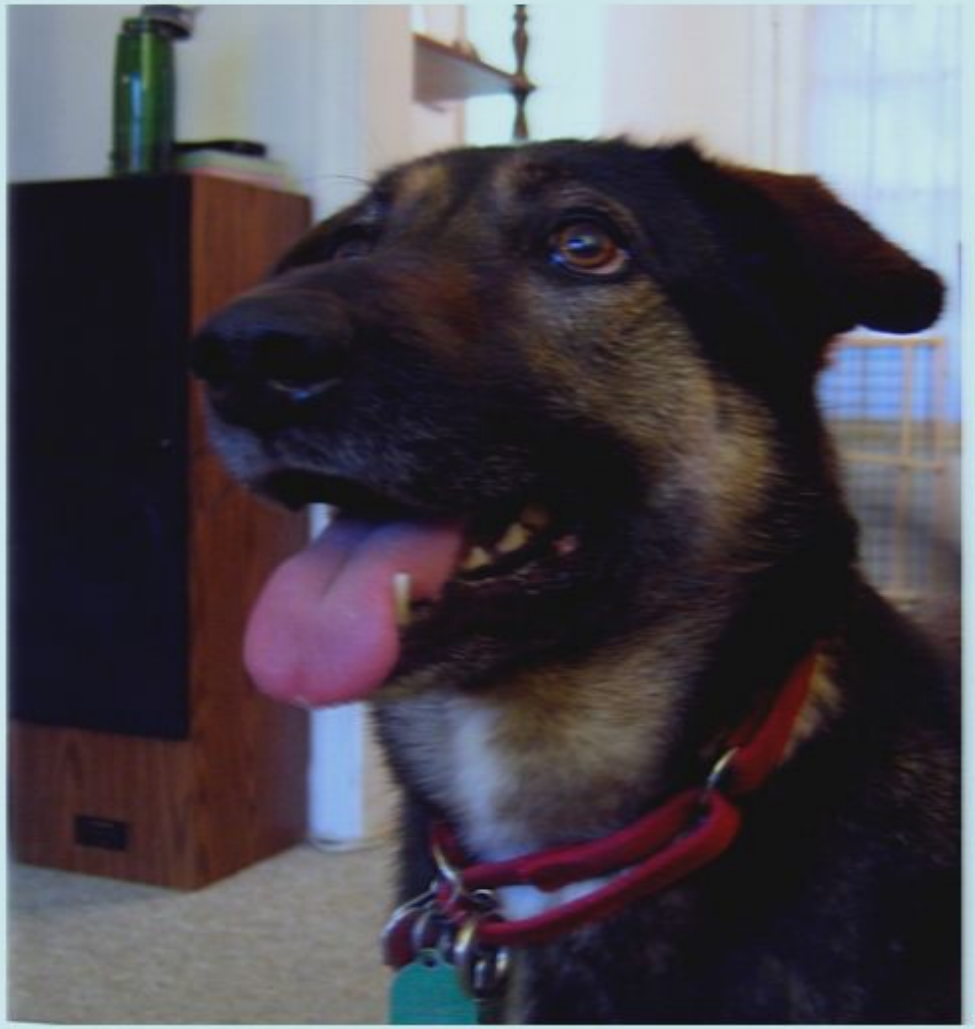


Emmy, Queen of Niskayuna

Many Worlds, Many Treats

May 2007:

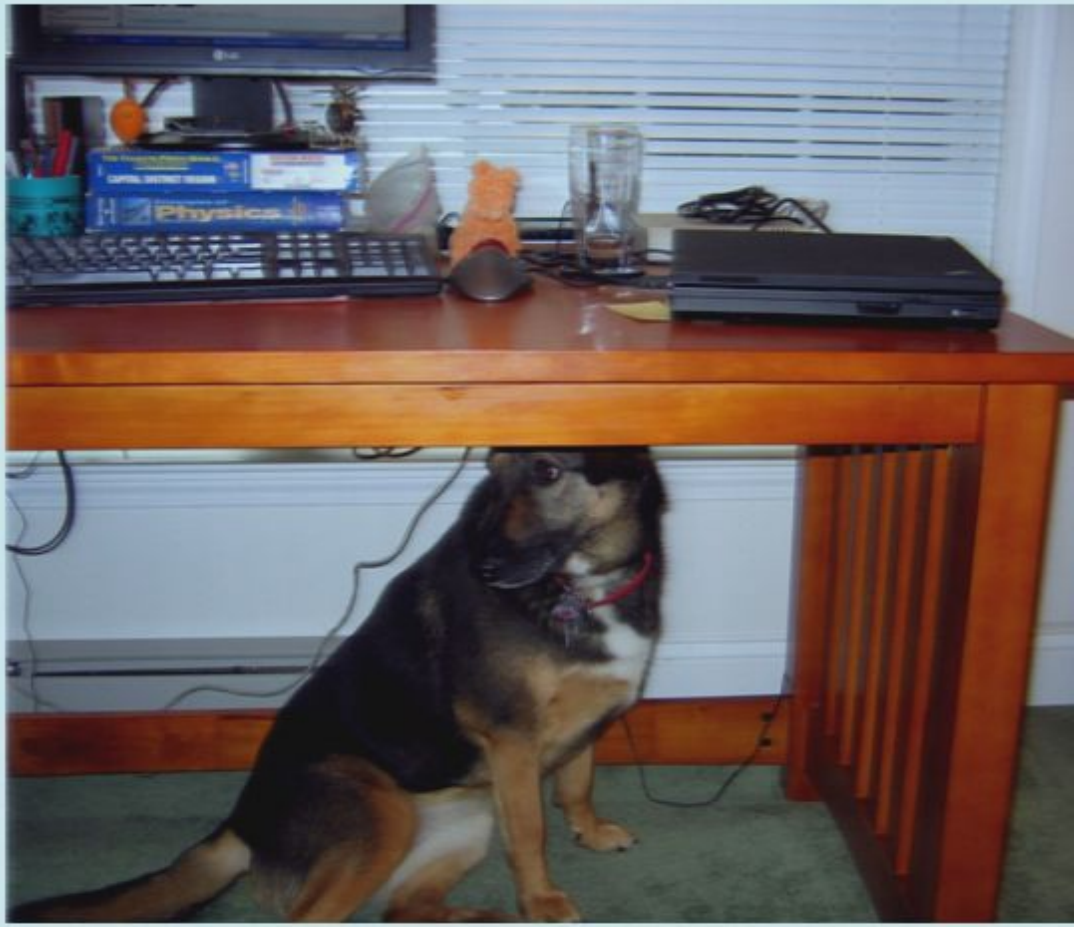
I'm sitting at the computer typing, when the dog bumps up against my legs. I look down, and she's sniffing the floor around my feet intently.

"What are you doing down there?"

"I'm looking for steak!" she says, wagging her tail hopefully.

"I'm pretty certain that there's no steak down there," I say. "I've never eaten steak at the computer, and I've certainly never dropped any on the floor."

"You did in some universe," she says, still sniffing.



Bunnies Made of Cheese: The Book

"Many Worlds, Many Treats" linked by Boing Boing, Digg

→ more than 50,000 readers

Contacted by agent

→ Book proposal, bought by Scribner

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Extreme example, but illustrates general principle

Use blogs to promote science
produce new opportunities for outreach

Other Blog Projects

Books, articles

Posts re-printed in magazines, other sites

Books: Janet Stemwedel, *The Open Laboratory* collections, etc.

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Charity

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Polls, etc.

- "Greatest Physics Experiment," "Top 100 Science Books"

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Blog Experiments

- Blogger SAT Challenge, "Casual Fridays"

Quantum Diaries

QUANTUM DIARIES journal diario 전표 tagebuch ジャーナル diary dagboek 學報 diário

Follow physicists from around the world as they live the World Year of Physics.

- LATEST POSTS
- THIS WEEK
- THE PHYSICISTS
- AROUND THE WORLD
- WORLD YEAR OF PHYSICS
- ABOUT QUANTUM DIARIES
- BUZZ
- SUBSCRIBE
- FIND A BLOG

Ursula Bassler
IN2P3
France
Lang: English

Ursula co-leads a team that's improving measurements of very high-energy proton-antiproton collisions. She played the melodica, which is essentially a piano you blow into.

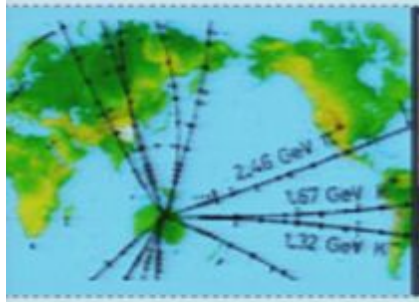
World Year of PHYSICS 2005
www.physics2005.org

New

A fond farewell
Thanks for joining us as we chronicled 2005, the World Year of Physics, through the eyes of thirty-three working physicists.

Relive the World Year
You can experience the World Year of Physics all over again by **visiting the Quantum Diaries archives**.

Last words
Read the Quantum Diarists' **famous last words**, as they review the year past and look ahead to the year to come.



Peter Steinberg

December 28, 2005

The scientific method is not just a tool for finding out mere facts about isolated phenomena in the world: it's a whole way of looking at everything around you, from science to culture to politics. **Read more...**

Caolionn O'Connell

December 26, 2005

As it turns out, I'm not so special. Between my fear of wild animals to my thesis troubles, there was always a reader, or five, who had been in the exact same predicament. And I realize it is a bit cheesy to say, but it was nice to know I wasn't alone. **Read more...**

LHC Blogs

Institutional blogs starting to appear

Quantum Diaries

LHC Blogs

Mostly high-energy physics

Learned from SSC

Physics Buzz

Physics Central blog

APS outreach program

General-interest physics news stories

Professional groups starting to catch on

Still more to be done

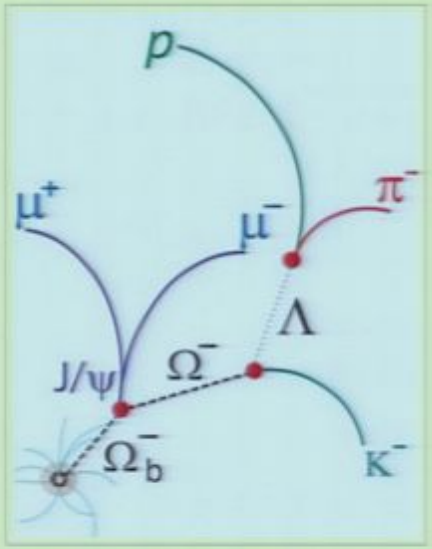
Physics Buzz

Physics Fun and Science News. Socks Optional.

Brought to you by PhysicsCentral.com

FRIDAY, SEPTEMBER 05, 2008

Quarky New Particle.



Particle physics is notorious for its funny-sounding jargon, and "quark" is no exception.

Physicists at Fermi National Accelerator Laboratory have discovered a new particle, Omega-sub-b. The particle is made of three quarks (two strange quarks and one bottom quark).

Quarks are fundamental particles that join together in different combinations to make more familiar particles like protons and neutrons. Omega-sub-b is about six times heavier than the mass of a proton. It was discovered by Fermilab's DZero experiment, using the tevatron particle collider.

Quarks are gregarious, they're always found in combination with other quarks and never alone. As you can imagine, this makes obtaining

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Slashdot It!

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- Martica
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- Agent Utah
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- Clio
- thephysicsbabe
- The Mathlete

Feeds

- Atom Feed

Conclusions

Public understanding, support for science shaky

Feast-or-famine funding instability

Academic culture does not reward public outreach

Technical, "Newtonian" publication preferred

Claim: Need more outreach to build constituency for science

"Galileian" publication

Claim: Web logs offer a powerful tool for public outreach

Training ground for future Galileians