Applied Physics Seminar

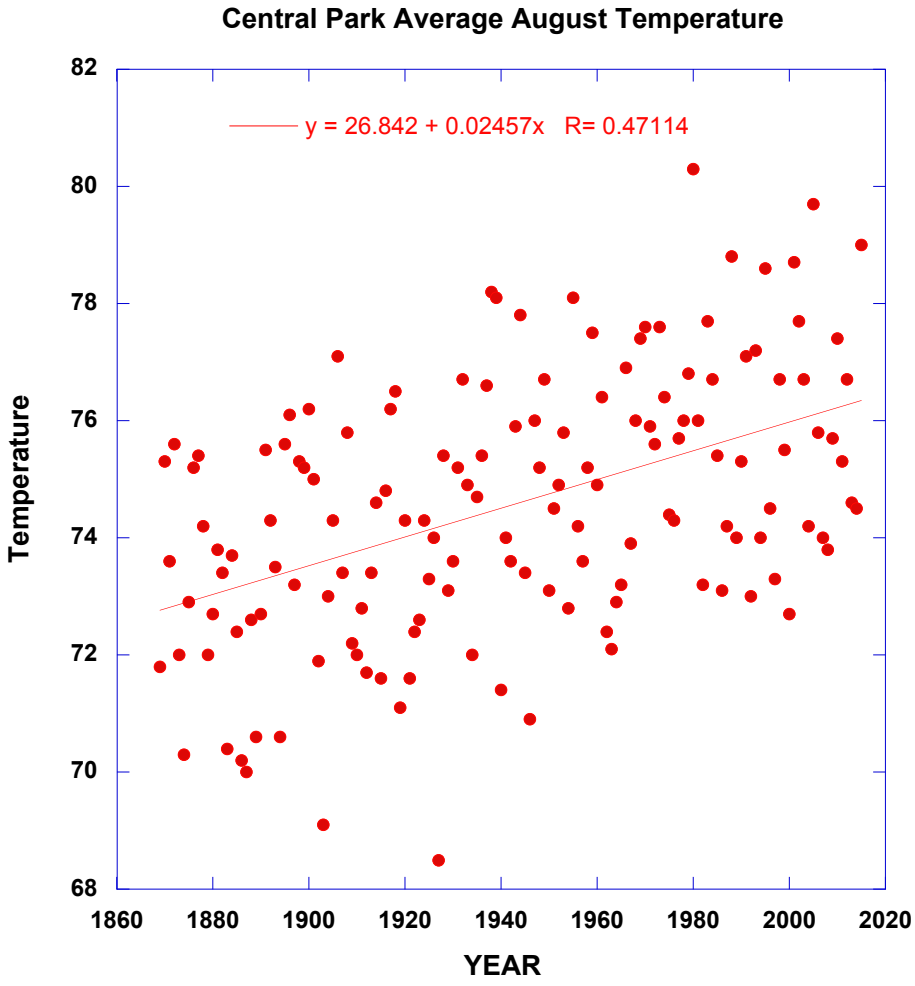
Lunch time, Every Wednesday

APPH E4901: Discussion of specific and self-contained problems in areas such as applied EM, physics of solids, and plasma physics.
Topics change yearly.

APPH E4903: Discussion of specific and self-contained problems in areas such as applied EM, physics of solids, and plasma physics.

Formal presentation of a term paper required.
Topics change yearly.

Central Park Temperature



http://www.weather.gov/okx/CentralParkHistorical

PRESIDENT OBAMA'S TRIP TO ALASKA

whitehouse • 16h + Follow

Markers throughout Exit Glacier show how much it's receded over time. The impacts of climate change are real, and the people of Alaska are living with them every day. It's never been more important for us to work together to address this challenge. -bo

33.3k likes 892 comments Instagram

whitehouse • 17h + Follow

Starting today, every 4th grader can now visit our public lands for free. The fact that this young person I met at Kenai Fjords National Park and kids from every background all across the country will get a pass to visit our national parks is cool, but it also speaks to something bigger — we're connecting kids with our heritage and history. -bo

22.8k likes 334 comments Instagram

COLUMBIA DAILY SPECTATOR
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SPECTRUM | CAMPUS

Obama is coming back to town in 2017, and more highlights from Convocation

BY ARIELA MARTIN AND SAMANTHA COONEY | | AUGUST 31, 2015, 4:57 PM

Updated, Aug. 31 at 7:27 p.m.: The University just dropped a statement regarding University President Lee Bollinger's remarks—and the University said it has no formal association with President Barack Obama, CC '83, yet.

"Lee Bollinger's comment at Convocation today that he was looking forward to welcoming back Columbia's most famous alumnus only reiterated the May 12 statement by the Barack Obama Foundation that it 'intends to maintain a presence at Columbia University for the purpose of exploring and developing opportunities for a long term association' and reflected no further developments concerning President Obama's plans," the statement read.

The White House has also pushed back on Bollinger's statement, telling Politico, "The President has long talked about his respect for Columbia University and his desire to continue working with them. ... However, at this point no decisions have been finalized about his post-Presidency plans."

The New York Times

Wednesday, September 2, 2015 | Today's Paper | Video | 89°F | Nasdaq +1.38%

The Opinion Pages | EDITORIAL

Mr. Obama's Urgent Arctic Message

By THE EDITORIAL BOARD SEPT. 1, 2015

A presidential trip has enormous power to focus attention on a place and an issue, and President Obama's trip to Alaska has been minutely choreographed with visits to glaciers, threatened Inuit villages and the like to provide a stunning and alarming context to his message on the urgent need to address climate change.

Four times in a 24-minute speech in Anchorage he declared that "**we're not acting fast enough,**" a message especially true in the countdown to December's United Nations climate conference in Paris. **This will be the most ambitious effort by the world's nations to produce an equitable deal on reducing greenhouse gases**, and the United States, as the world's second-largest emitter of carbon gases (after China), must be at the forefront of the effort.

Alaska is the president's last stop on a late-summer climate change tour designed to enhance his record on the issue as well as America's leadership position and its leverage at the Paris talks. At a conference in **Las Vegas,** he threw his weight behind the solar energy industry and unveiled initiatives aimed at increasing energy efficiency. In **New Orleans**, on the 10th anniversary of Hurricane Katrina, he spoke of the need to make coastal cities more resilient as they face the rising seas and stronger storms that a warming planet is likely to bring.

...

2015 Seminar Theme

- Innovation and science for energy and climate
- The science of climate
- The technology of energy, and
- The wide ranging policy options aimed to bring about a sustainable future.

To understand climate and energy is to understand one of the most important issues of our time.

2015 Seminar Plan

- Ad hoc "Innovation Teams": **Groups of five students**
- Gather information, discuss, brainstorm, and develop group consensus
- Can be "long term" research plan or "short term" business plan (more on this later…)
- Present interim "idea" report for in-class review
- Present "pre-proposal" (4 pages max.) describing your (near-term/long-term) innovation plan
- Present Final Report to class and submit written reviews/score sheets of proposals from your classmates

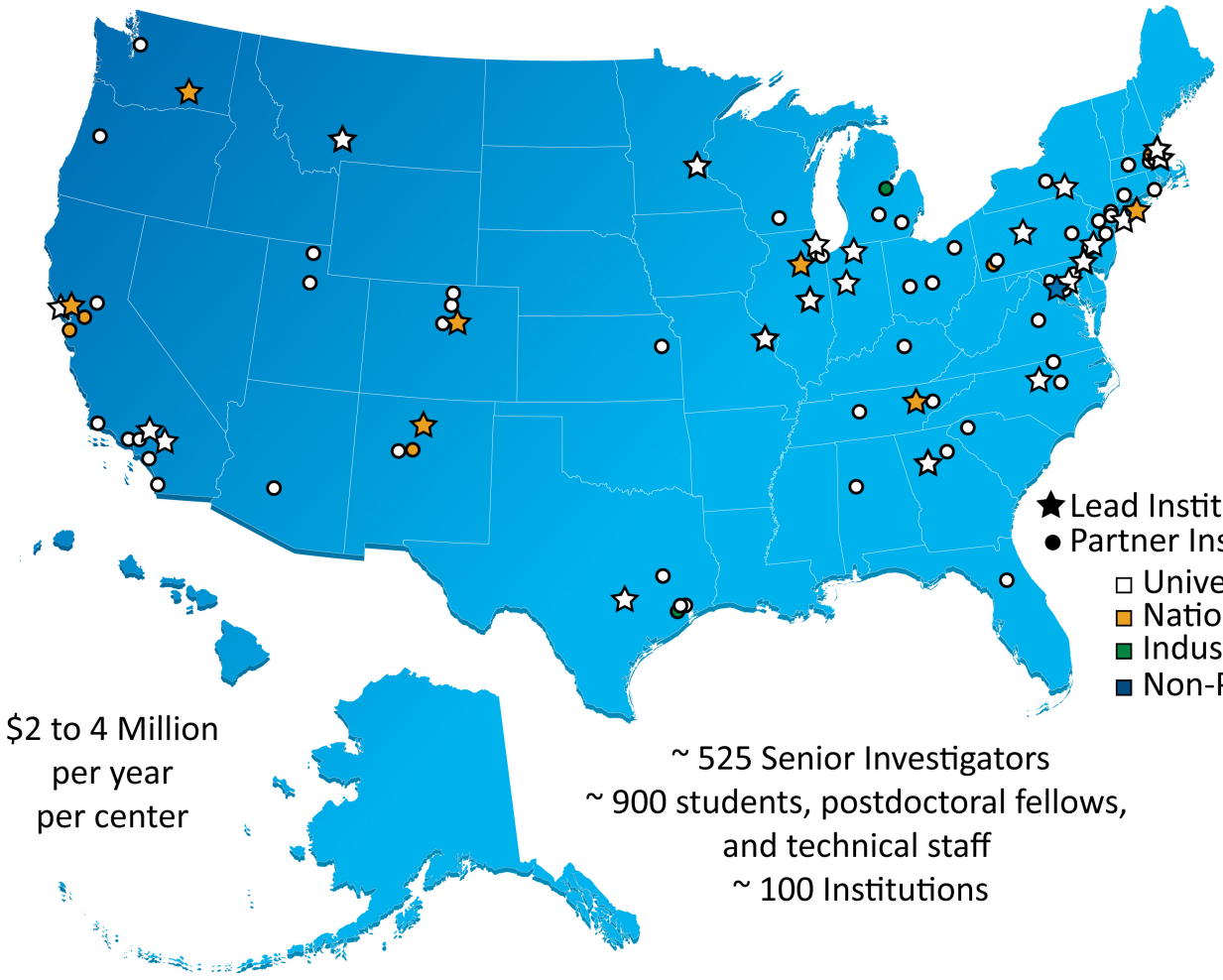
Example of "Long-Term" Innovation Plan

U.S. DOE ($100M/year)

"History has demonstrated that radically new technologies arise from disruptive advances at the science frontiers."

"… accelerate transformative discovery, combining the talents and creativity of our national scientific workforce with a powerful new generation of tools for penetrating, understanding, and manipulating matter on the atomic and molecular scales."

32 EFRCs in 33 States + D.C.



U.S. DEPARTMENT OF ENERGY | Office of Science

$2 to 4 Million per year per center

~ 525 Senior Investigators
~ 900 students, postdoctoral fellows, and technical staff
~ 100 Institutions

http://science.energy.gov/bes/efrc/

Example of "Near-Term" Innovation Plan

POWERBRIDGE NY

PowerBridgeNY is a Collaborative Effort Across Downstate Institutions, with $10 Million in Funding from NYSERDA

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

BROOKHAVEN NATIONAL LABORATORY

CORNELL NYC TECH

Stony Brook University

NYU

CUNY The City University of New York

Idea Grant Submission

- $1,000 for ideas that are invited to & do submit a pre-proposal

Validation Phase

- Up to $150K in tranche funded for technical proof-of-concept & business validation
- Support from Mentors & student teams

Ignition Phase

- $50K for company launch & marketing

http://sites.apam.columbia.edu/courses/apph4903-2015/

APPH E4901 & E4903 Applied Physics Seminar

Fall 2015 Theme

Innovation and science to advance our national energy and climate goals

(a.k.a. "How can scientific and technical innovations help solve the world's energy-climate crisis?)

Email: mauel@columbia.edu

General | Theme | Grading | Syllabus | GRE | Innovation Teams | Links

General

Welcome to the APPH E4901 & E4903 *Applied Physics Seminar* class information site. ***MW 11:40 - 12:55 Room 327 S. W. Mudd***

APPH E4901x *Applied Physics Seminar* 1 pt. Discussion of specific and self-contained problems in areas such as applied EM, physics of solids, and plasma physics. Topics change yearly. This course is usually reserved for third-year students majoring in Applied Physics.

APPH E4903x *Applied Physics Seminar* 2 pt. Involves students in all of the discussions that are part of **APPH E4901**, but also involves the preparation of a formal term paper or presentation on a research topic of the student's choice. This course is usually reserved for graduating seniors majoring in Applied Physics.

Topics change every year and are designed to introduce students in to current research in applied physics.

Theme

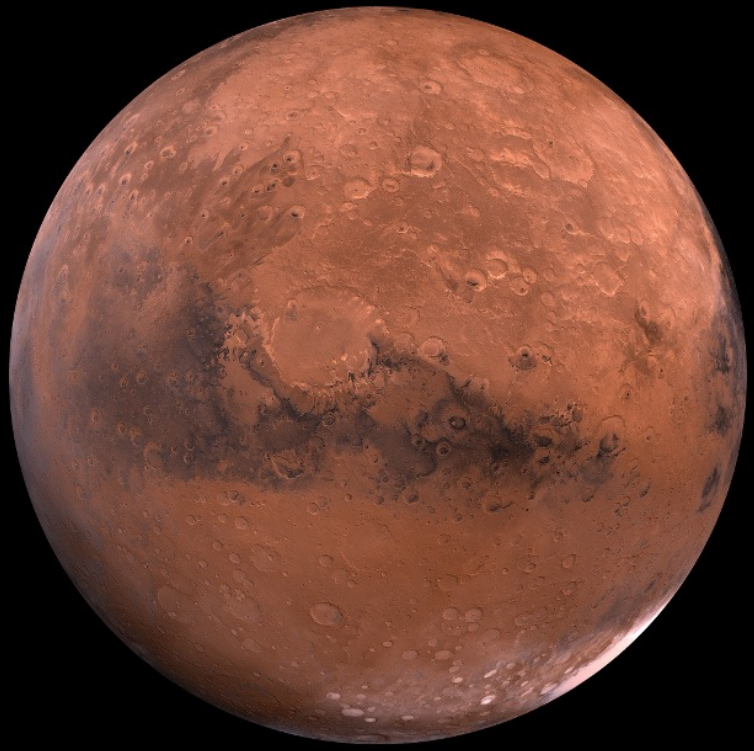
This year's theme is innovation and science for energy and climate. We will discuss the science of climate, the technology of energy, and the wide ranging policies discussed to bring about a sustainable future. To understand climate and energy is to understand one of the most important issues of our time.

Planetary exploration has shown how a planet's atmosphere effects climate. Compare Venus and Mars.

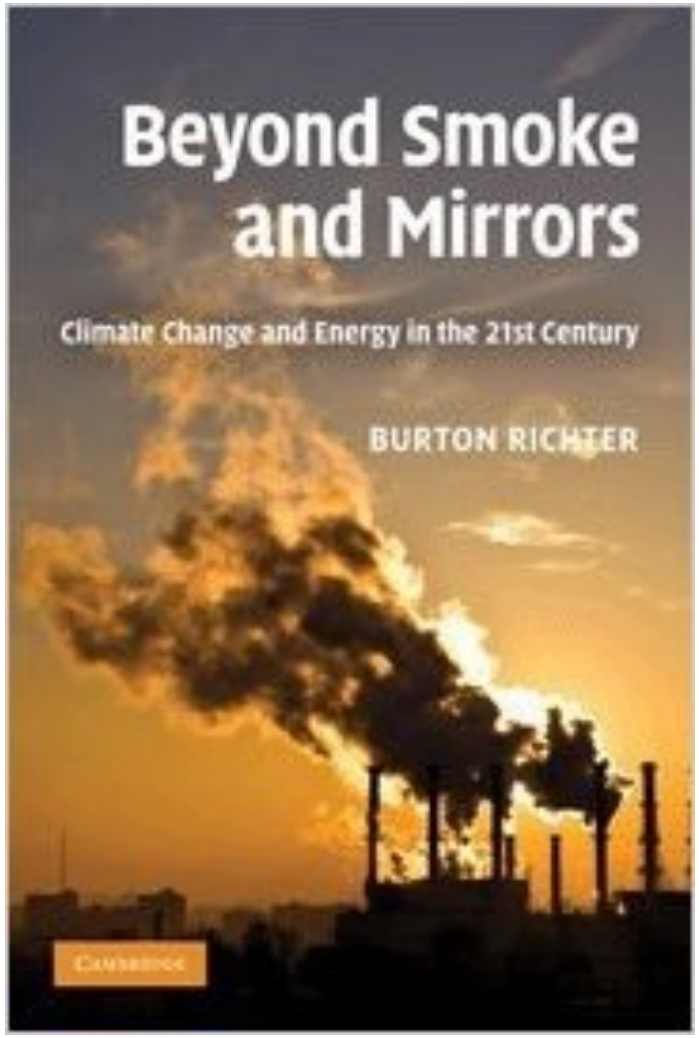
Venus is a closes twin of Earth. Both Venus and Earth have nearly equal size and composition is largely the same as Earth's. The orbit of Venus is close to Earth's. Both worlds have relatively young surfaces thick atmospheres with clouds. But the atmosphere of Venus is very dense (very high pressure) and made of carbon dioxide. Because Vensus has an extreme greenhouse effect, the surface of Venu can reach a 870 degrees Fahrenheit (470 degrees Celsius).

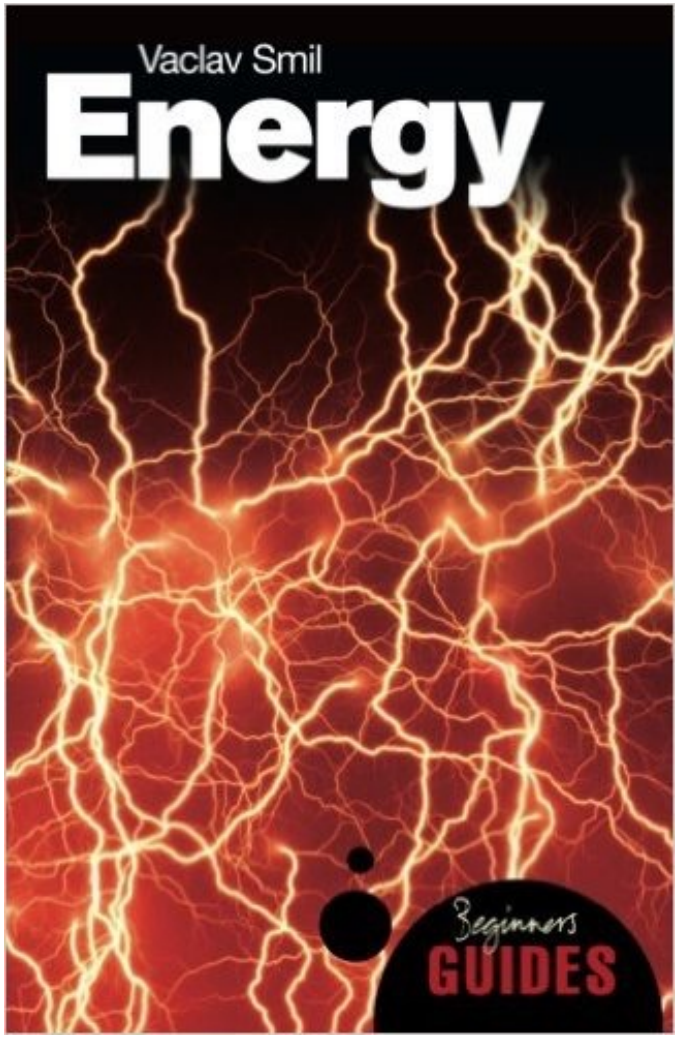
Mars is at the opposite extreme from Venus. Mars atmosphere is about 100 times less dense than Earth's (and nearly 9,000 times less dense than Venus). Being further from the Sun and without any greenhouse effect at all, Mars is a cold, about - 80 degrees Fahrenheit.)

Understanding Science



Text Books and Guest Speakers





My own interests in "Energy Science" came from fusion energy research

- Plasma physics: a "new science" of the 20th, 21st, ... century
- I've served on more than 40 government science policy and advisory panels (many scientists do too!), including
  - 1987 Panel of Congressional Office of Technology Assessment
  - 1990 NSF Small Business Innovative Research Panel
  - 1990 DOE D-T Fusion Review Panel
  - 1990-2012 Over thirty (!) fusion facility review panels
  - 2007-2014 Member and Chair of NRC Plasma Science Committee
  - 2012-2015 Member of Science Evaluation Group of Canadian NSERC
- 2006-2007 Jefferson Science Fellow serving in International Energy Policy Office of Dept of State

My Sabbatical Year as a Diplomat

(2006-2007)

Assignment for Next Week

- What motivates your interest in applied physics?
- Name three (potentially) innovative science or technology ideas that may contribute to our national energy and/or climate goals? (no more than three)
- If you were part of an energy technology "start-up", what role(s) would you like to play?

Send by email to mauel@columbia.edu
before C.O.B. next Tuesday