Physics/Global Studies 280

Module 1: Introduction to the Course

Physics/Global Studies 280 Goals

(1) To provide a basic understanding of the nature of nuclear weapons, the threat they pose to humankind, and possible ways to reduce and eventually eliminate this threat.

(2) To improve technical writing skills, as used in academia, government and business.

Physics/Global Studies 280 Goals

Goal for Writing in 280

(1) Study and review course related material.

(2) Develop writing skills in changing technical writing styles:
Scientific American, Congressional Research Service, National Counter Terrorism Center (NCTC) brief, a scientific journal.

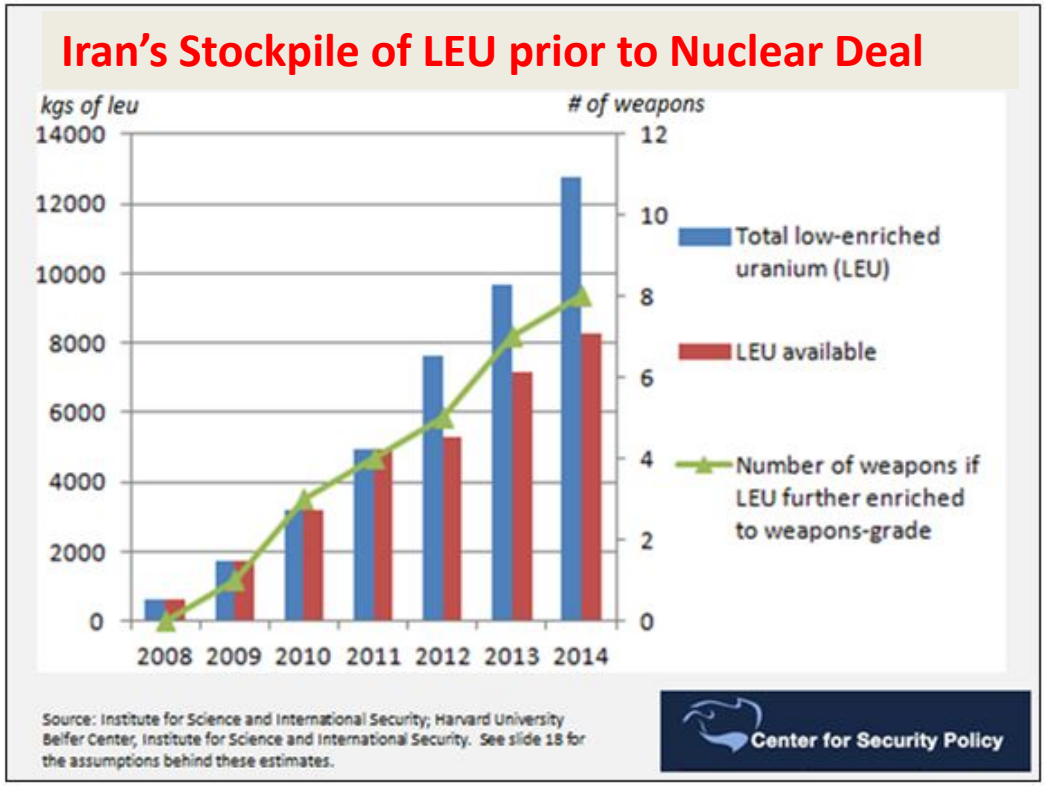
(3) Practice attention to detail that is necessary for successful professional writing.

➔ Part of College of Engineering effort to improve technical writing skills. (alumni career surveys indicate that writing skills are highly important for professional success).

Physics/Global Studies 280: Motivation

What are current concerns with regards to nuclear weapons, 25 years after the end of the cold war?

Five Examples: (I) Further proliferation of Nuclear Weapons



Physics/Global Studies 280: Motivation

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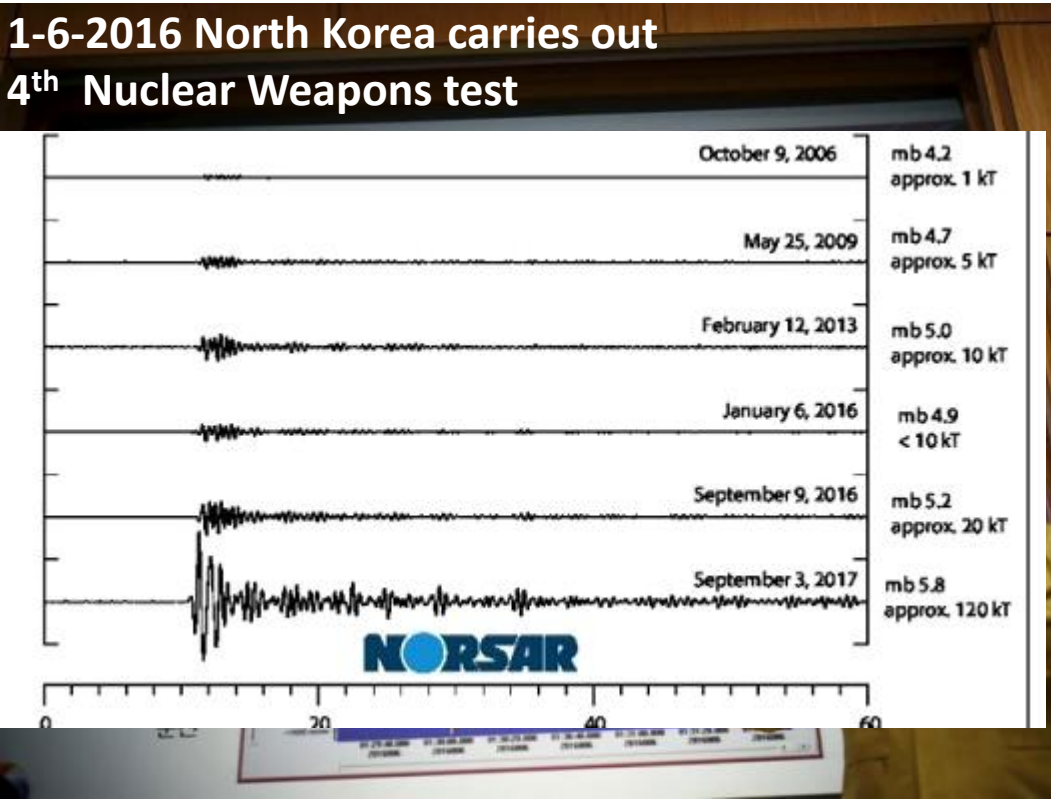
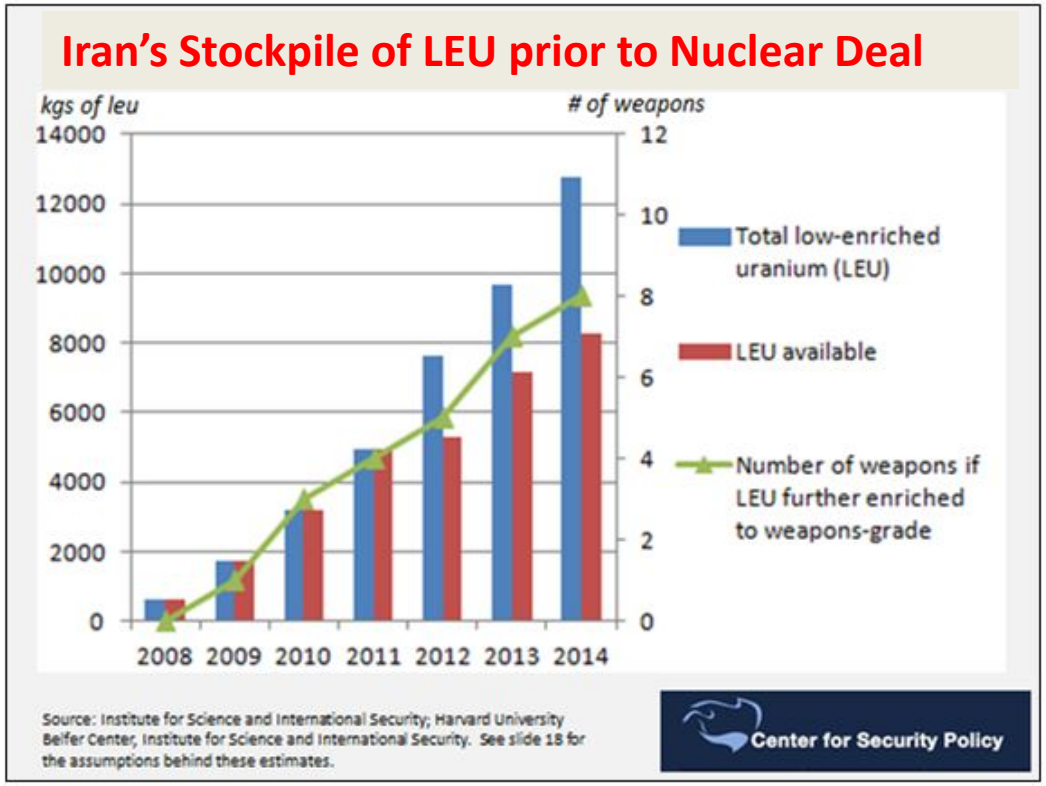


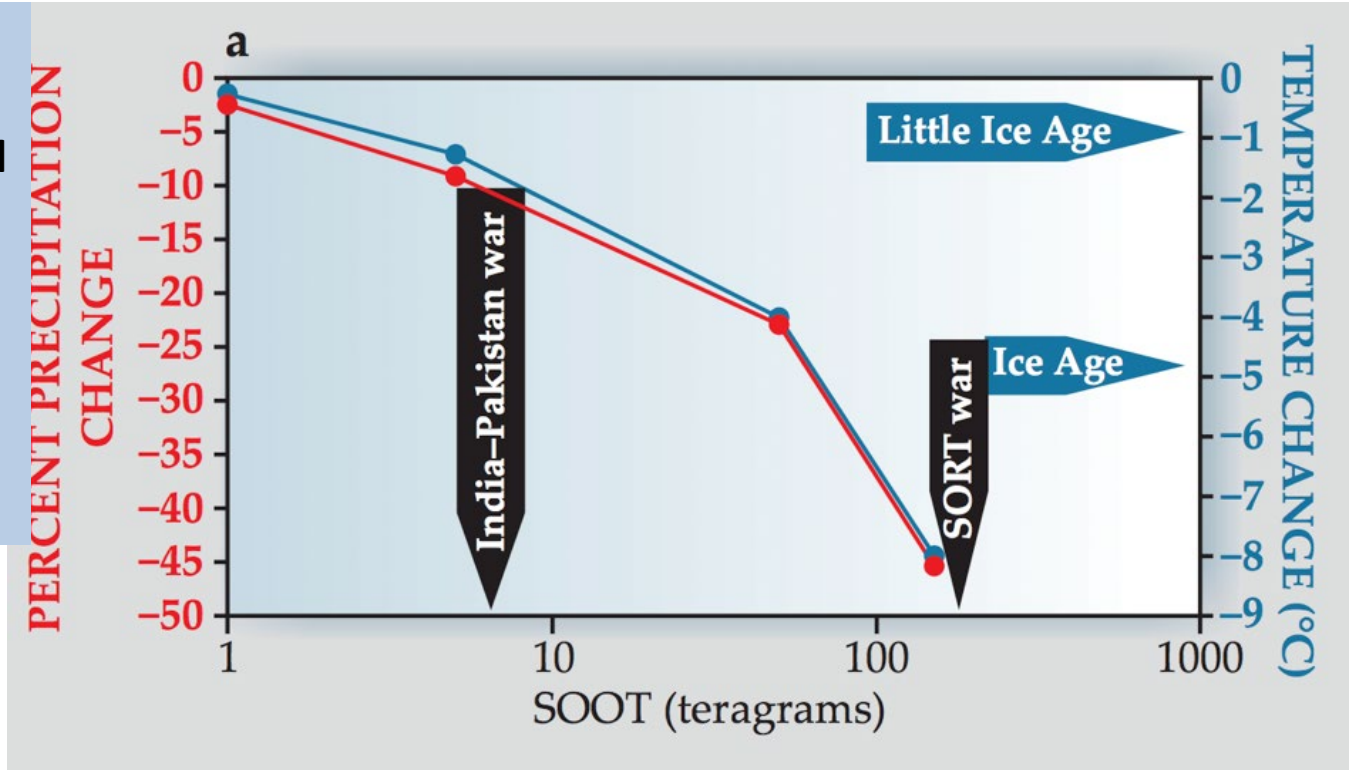


Physics/Global Studies 280

(II) “Limited scale” nuclear conflict appear possible:
current concerns are the situation on the Korean Peninsula and the tensions between Pakistan and India. Possible future concerns include the middle east.

Temperature change from soot ejected into the atmosphere would lead to a temperature decrease:

“Nuclear Winter”



Physics/Global Studies 280

III) Nuclear Terrorism

If terrorists could gain access to nuclear weapons they could target events such as the NATO summit that took place in Chicago in May of 2012 with all NATO heads of state present.

chicagotribune.com

Trial to begin of three charged with planning attacks at NATO summit

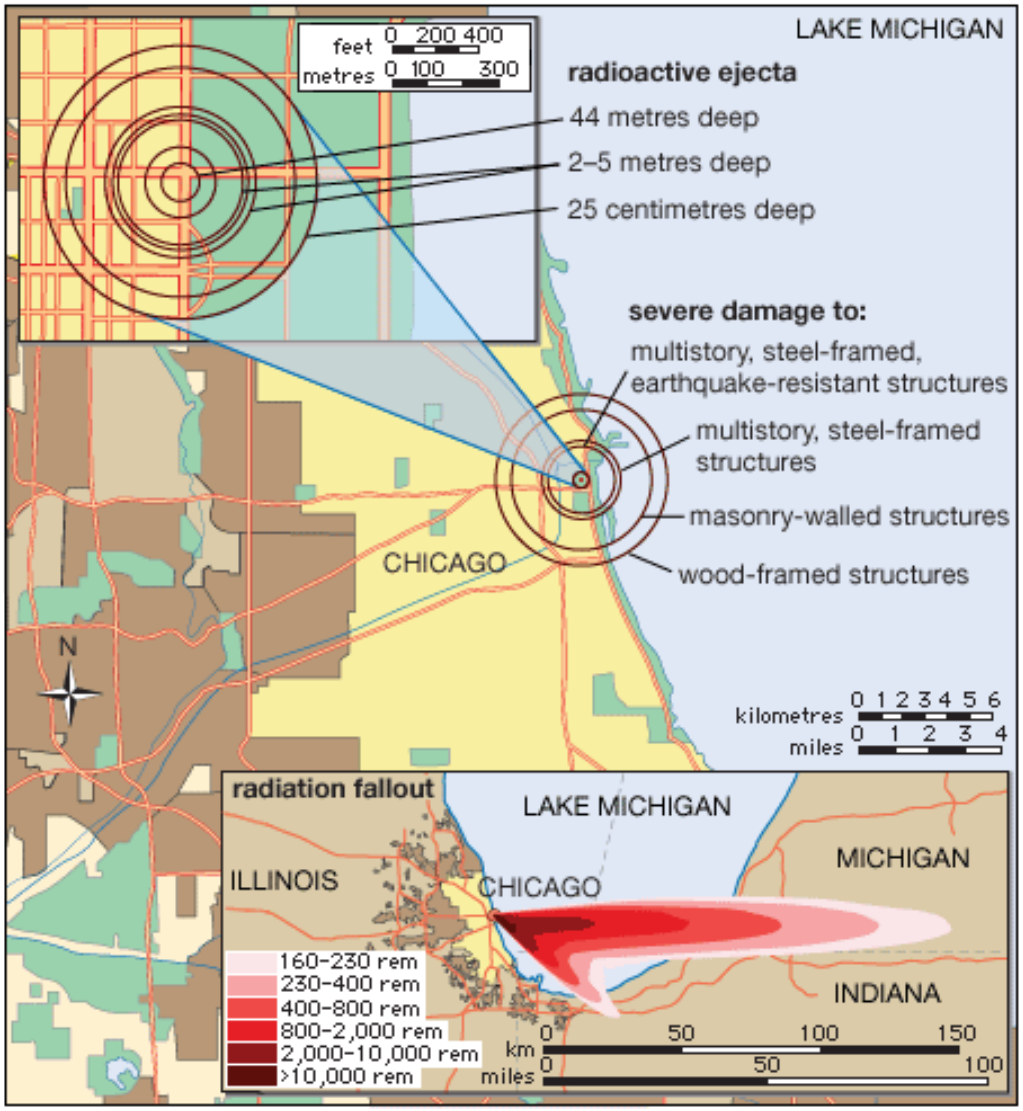
Mary Wisniewski

Reuters

7:31 AM CST, January 21, 2014

CHICAGO (Reuters) - Opening statements are due to begin on Tuesday in the trial of three men accused of plotting to attack high-profile targets, including President Barack Obama's re-election campaign headquarters, during the 2012 NATO summit in Chicago.

Brent Betterly, 25, Brian Church, 25, and Jared Chase, 29, are being prosecuted under an Illinois anti-terrorism law adopted after the September 11, 2001 al Qaeda attacks.



Physics/Global Studies 280

IV) The challenge to safeguard nuclear materials long-term:

U.S.

ELDERLY NUN SENTENCED TO NEARLY THREE YEARS FOR TENNESSEE NUCLEAR BREAK-IN

BY REUTERS AND BIZU.TV ON 2/19/14 AT 12:43 PM

In 2012 Sister Megan Rice, Michael Walli and Greg Boertje-Obed advanced through several fences reaching a storage facility for nuclear material at the Y-12 nuclear facility in Oakridge.

➔ If such incident can happen in the US: what are the standards for nuclear safeguards in other countries?

Physics/Global Studies 280

V) Challenge to sustain high quality nuclear forces under "hair trigger alert" long-term:

The New York Times http://nyti.ms/1iX3ZG8

POLITICS

Cheating Accusations Among Officers Overseeing Nuclear Arms

By HELENE COOPER JAN. 15, 2014

WASHINGTON — The Air Force said on Wednesday that 34 officers responsible for launching the nation's nuclear missiles had been suspended, and their security clearances revoked, for cheating on monthly proficiency tests that assess their knowledge of how to operate the warheads.

Defense experts say that the end of the Cold War and the elevation of counterterrorism in the American military has led to low morale among the men and women, known as missileers, who live and work within a hair trigger of the country's 450 nuclear missiles. The missileers have increasingly come to view their mission as a backwater, with little chance of advancement to the top ranks of the Air Force.

➔ What are the standards for military nuclear operations elsewhere?

The Challenge of Dual Use of Nuclear Energy

(1) Benefits of peaceful use of nuclear energy including applications in electricity production, medicine, agriculture, propulsion etc. should be available to all!

(2) At the same time want to prevent access to devastating nuclear weapons! (Materials, technology and manpower for weapons program can be re-directed from civilian nuclear efforts.)

Current solution emerged from President Eisenhower's initiative: "Atoms for Peace"

Civilian use of Nuclear Energy monitored by the International Atomic Energy Agency (IAEA) + treaty to stop proliferation of nuclear weapons!

Example: Meeting Increasing Energy Consumption will use mix of Fossil + Renewables + Nuclear Power

Environmental Science & Technology

Article

pubs.acs.org/est

Burden of Disease from Rising Coal-Fired Power Plant Emissions in Southeast Asia

Shannon N. Koplitz,[*,†] Daniel J. Jacob,[‡] Melissa P. Sulprizio,[‡] Lauri Myllyvirta,[§] and Colleen Reid[∥]

[†]Department of Earth and Planetary Sciences, Harvard University, Cambridge, Massachusetts 02138 United States

[‡]John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, Massachusetts 02138 United States

[§]Greenpeace International, 1066 AZ Amsterdam, The Netherlands

[∥]Department of Geography, University of Colorado, Boulder, Colorado 80309 United States

Example: Meeting Increasing Energy Consumption will use mix of Fossil + Renewables + Nuclear Power

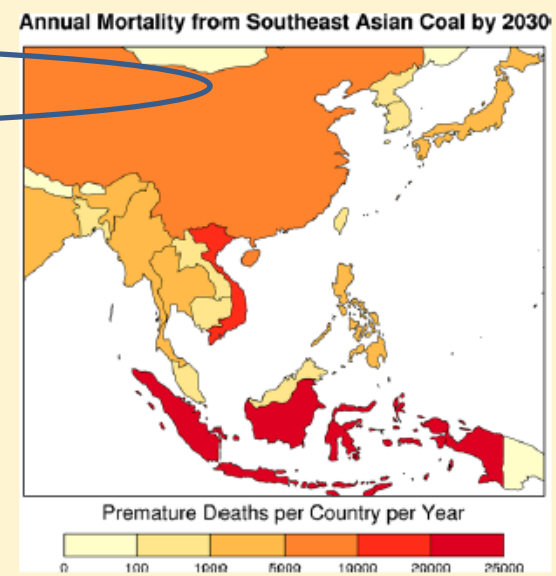
Environmental Science & Technology

Article

pubs.acs.org/est

Burden of Disease from Rising Coal-Fired Power Plant Emissions in Southeast Asia

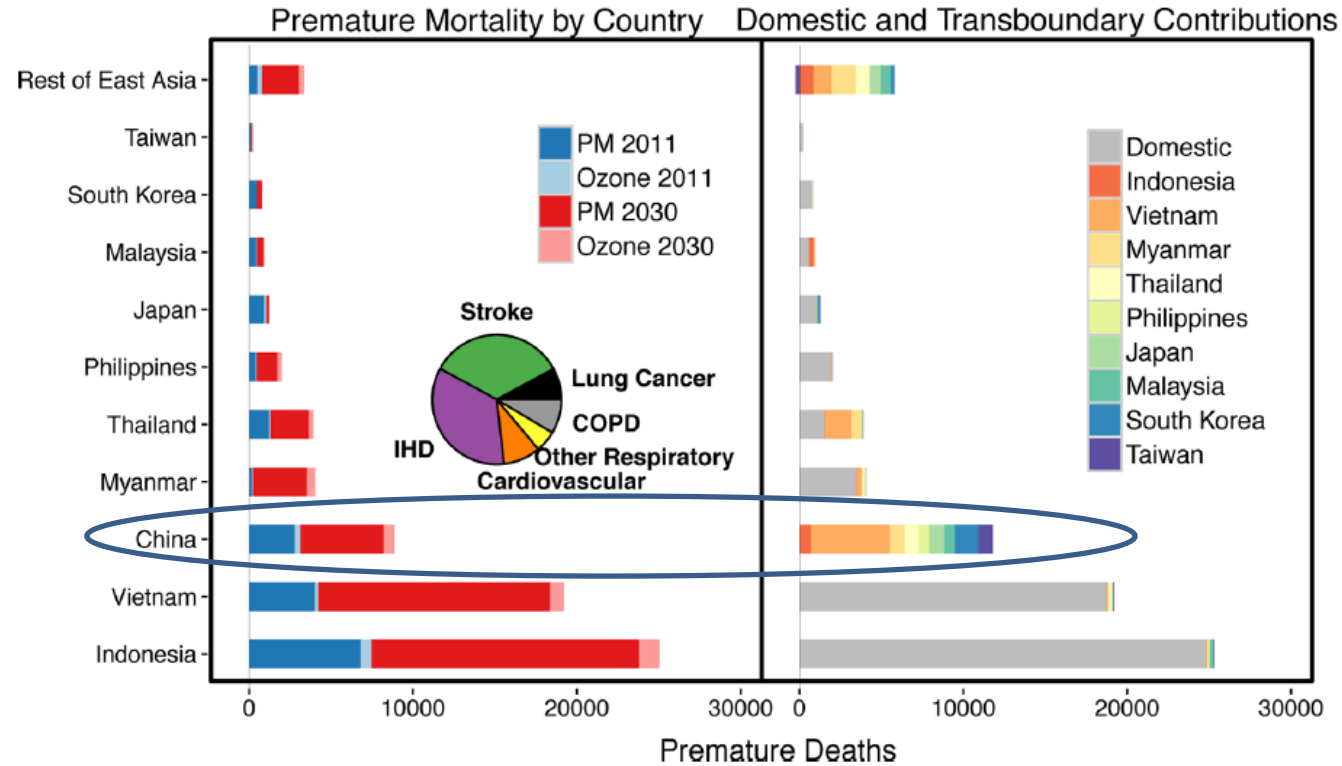
ABSTRACT: Southeast Asia has a very high population density and is on a fast track to economic development, with most of the growth in electricity demand currently projected to be met by coal. From a detailed analysis of coal-fired power plants presently planned or under construction in Southeast Asia, we project in a business-as-usual scenario that emissions from coal in the region will triple to 2.6 Tg a^{-1} SO_2 and 2.6 Tg a^{-1} NO_x by 2030, with the largest increases occurring in Indonesia and Vietnam. Simulations with the GEOS-Chem chemical transport model show large resulting increases in surface air pollution, up to 11 $\mu g\ m^{-3}$ for annual mean fine particulate matter ($PM_{2.5}$) in northern Vietnam and up to 15 ppb for seasonal maximum 1 h ozone in Indonesia. We estimate 19 880 (11 400–28 400) excess deaths per year from Southeast Asian coal emissions at present, increasing to 69 660 (40 080–126 710) by 2030. 9000 of these excess deaths in 2030 are in China. As Chinese emissions from coal decline in coming decades, transboundary pollution influence from rising coal emissions in Southeast Asia may become an increasing issue.



Example: Meeting Increasing Energy Consumption will use mix of Fossil + Renewables + Nuclear Power

Environmental Science & Technology

Burden of Disease from Southeast Asia



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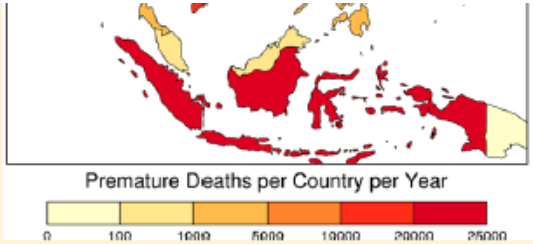
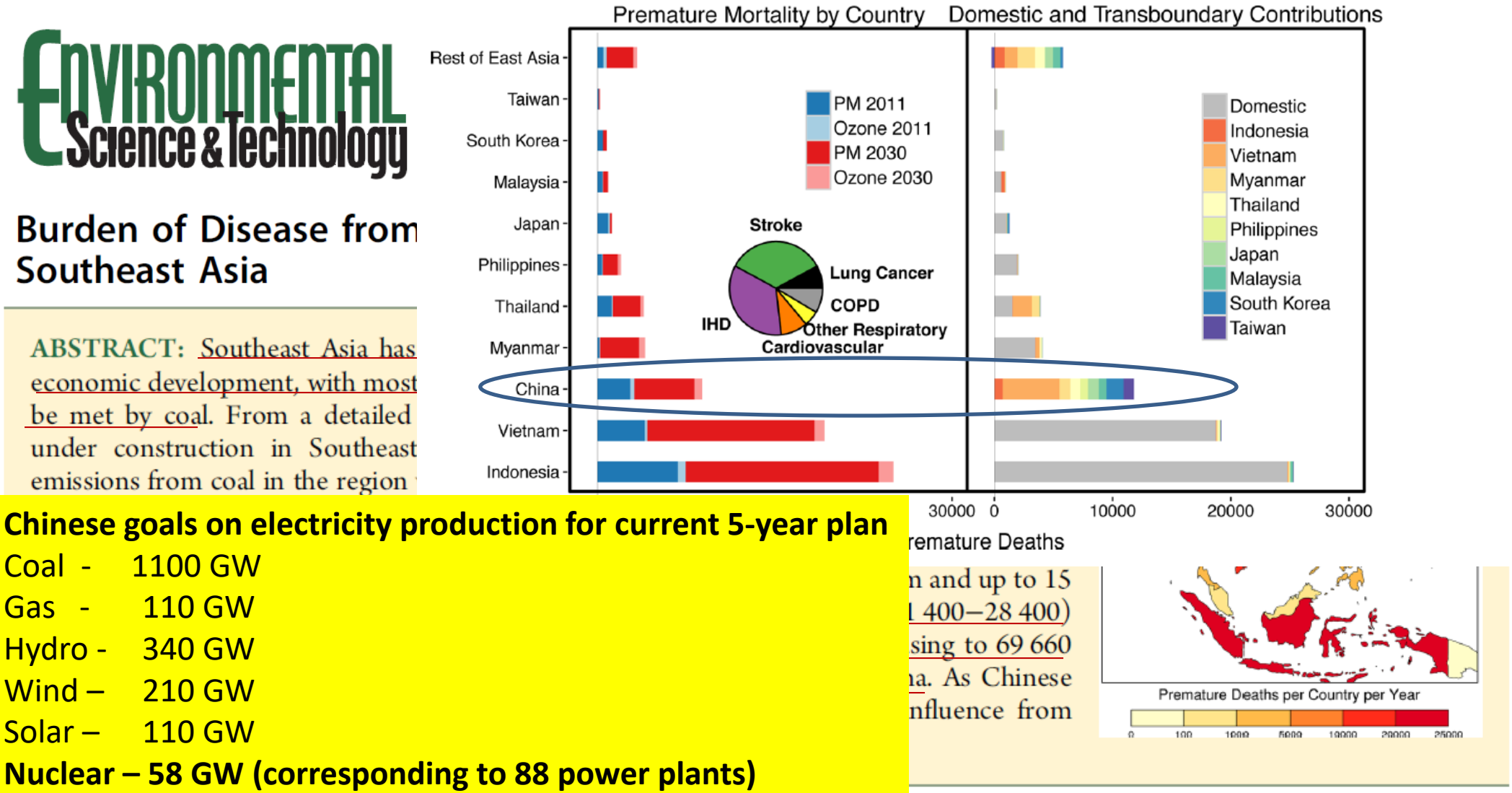


Each country will determine its own mix of fossil, renewables and nuclear power production.
Eg. current 5-year plan in China calls for increase from 58 nuclear power plants to 88 by 2021.
China intends to export nuclear reactor technology: **Dual use challenge of nuclear power is bound to stay!**

Example: Meeting Increasing Energy Consumption will use mix of Fossil + Renewables + Nuclear Power



Chinese goals on electricity production for current 5-year plan

Coal - 1100 GW
Gas - 110 GW
Hydro - 340 GW
Wind – 210 GW
Solar – 110 GW
Nuclear – 58 GW (corresponding to 88 power plants)

Each country will determine its own mix of fossil, renewables and nuclear power production.
Eg. current 5-year plan in China calls for increase from 58 nuclear power plants to 88 by 2021.
China intends to export nuclear reactor technology: **Dual use challenge of nuclear power is bound to stay!**

History of Physics 280

- First offered in Spring 1982
  - At the height of the nuclear arms race during the cold war
  - Motivated by concern about the growing threat of nuclear weapons and nuclear war
  - Professors Fred Lamb and Jeremiah Sullivan who developed and taught the course were active contributors to ACDIS at UIUC and arms control related work in the US
- Has been taught every spring semester since to 1700+ students
  - Integrated in ACDIS, many ACDIS students continue to take the class
  - Has served as model for courses elsewhere

Physics 280 Topics

- Introduction
- Nuclear weapons
- Effects of nuclear explosions
- Terrorism and the possibility of Nuclear Terrorism
- Military systems for delivering nuclear weapons
- Arsenals of “nuclear weapon” states
- Defenses against nuclear attack
- Nuclear arms control
- Current events including Iran and North Korea
- Future directions

Diverse Subject: 280 Students from Diverse Set of Fields

The class subject is multidisciplinary and so are the backgrounds of the students and TAs in class.

Good opportunity to learn, how to learn from each other (experts in different fields)!

Computer Science	10
Physics	8
Economics	7
Political Science	6
Chemistry	5
Mathematics	5
Computer Engineering	4
Global Studies	4
Molecular and Cellular Biology	4
Psychology	4
History	3
16 other majors	1-2

Introduction of Physics 280 Staff

Matthias Grosse Perdekamp, Course Director
Physics

Kelsey Luo, TA
Nuclear Engineering

Logan Meredith, TA
Physics

Paisley Meyer, TA
Global Studies, ACDIS

Nico Santiago, TA
Physics

Heather Schlitz, TA
Global Studies, Journalism

Kelly Searsmith, Technical Research Writer
Physics

Aric Tate, TA
Nuclear Engineering

Writing Lab Assignments and Office Hours

Writing Laboratories – start 1-27: Mondays in Loomis 143 and 147

L11 10-10.50am in LL 143
L12 11-11.50am in LL 143
L13 12-12.50pm in LL 143
L14 12-12.50pm in LL 147
L15 1-1.50pm in LL 143
L16 2-2:50pm in LL 143
L18 3-3:50pm in LL 143

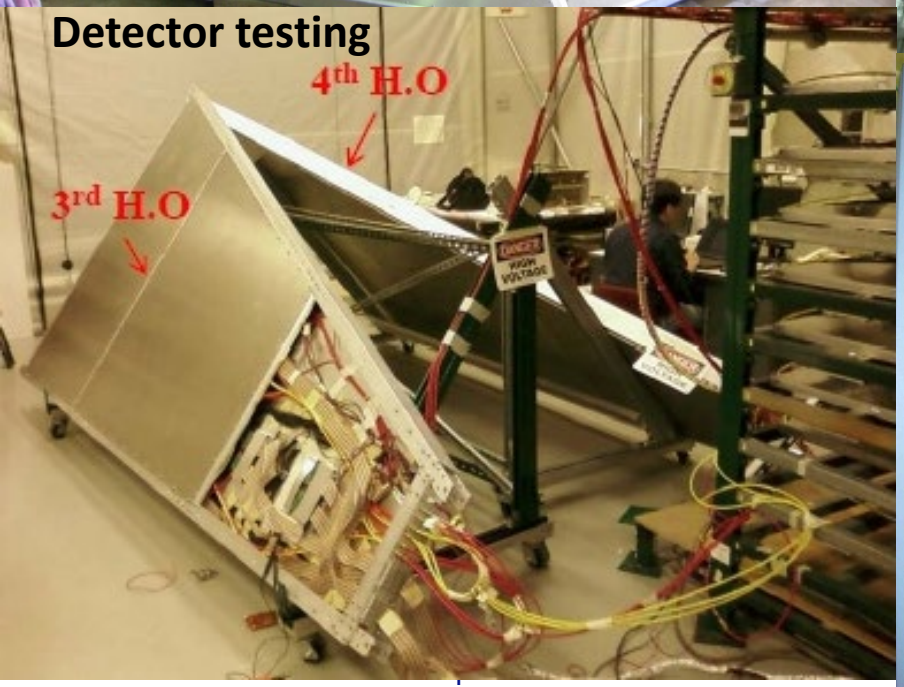
Office Hours – start 1-29: Wednesdays (location Grainger Library)

4pm – 5pm
5pm -- 6pm
6pm -- 7pm

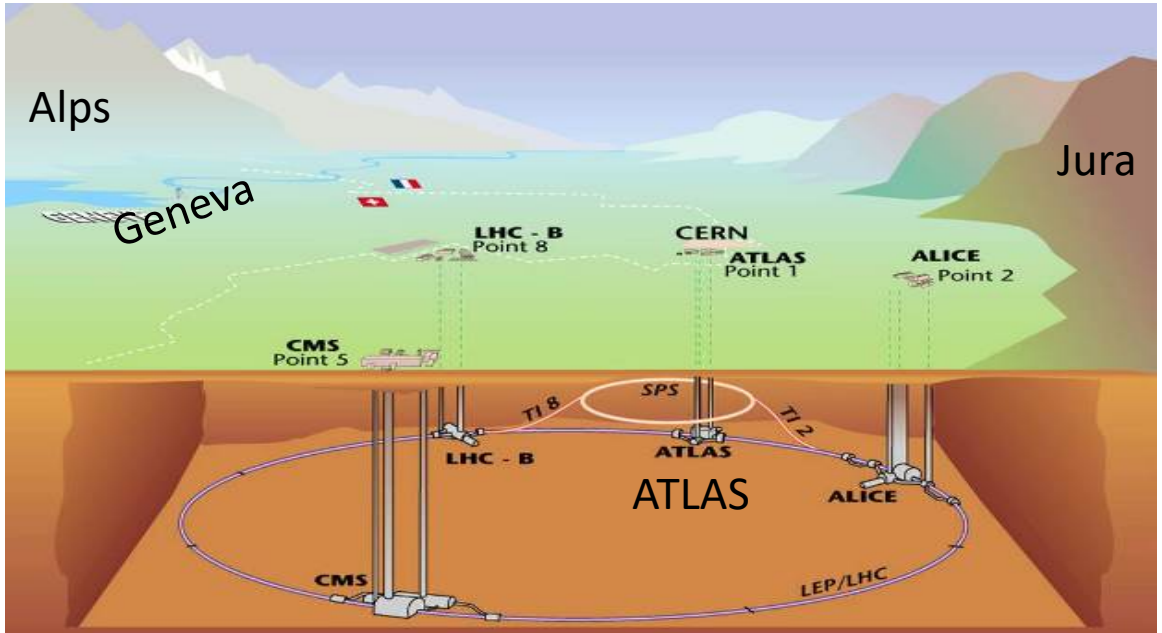
My Research: Nuclear Physics + Instrumentation

- Structure of nuclear matter using accelerators.
  - —Quark and gluon sub-structure of protons and neutrons
  - —nuclear effects in proton and neutron structure
  - —Transition of quarks to nuclear matter observed in nature
- Instrumentation for experiments at particle accelerators :
  - —PHENIX at Brookhaven National Laboratory, Long Island
  - —COMPASS at CERN, Geneva, Switzerland
  - —ATLAS at CERN, Geneva, Switzerland
- Instrumentation development for the detection of fissile materials.

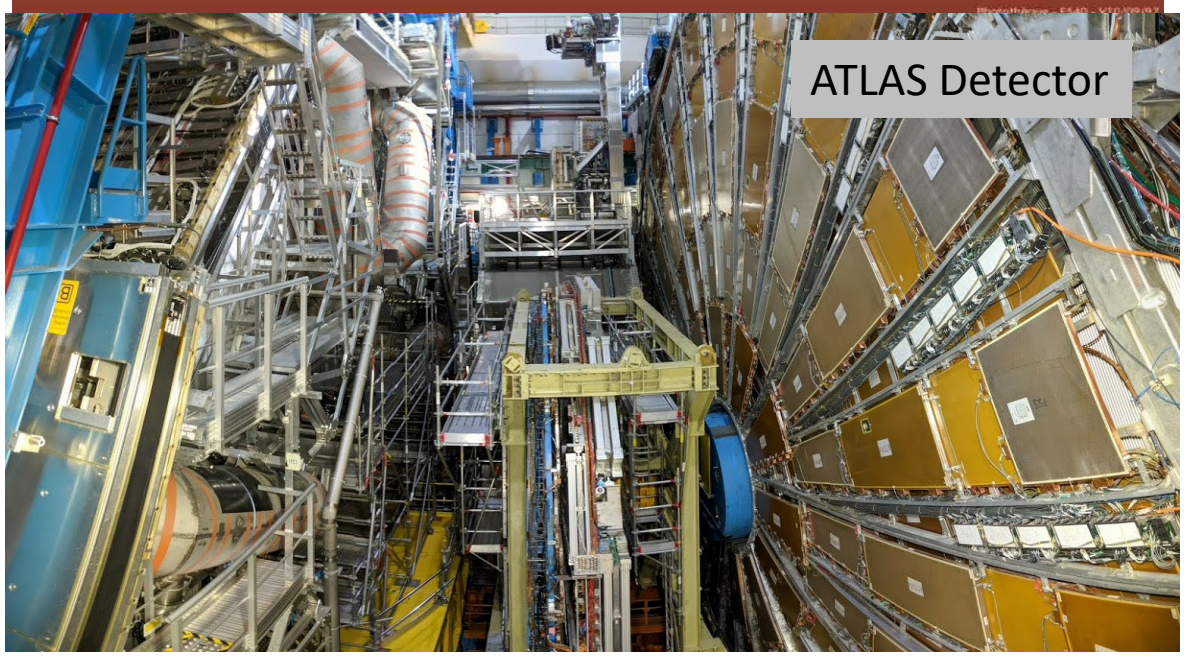
Instrumentation to Measure Quark and Anti-Quark Substructure of the Proton with the PHENIX Detectors

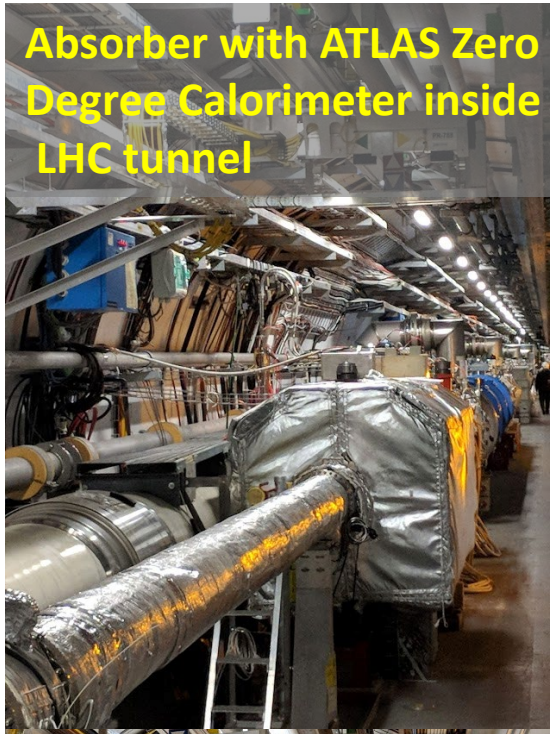


Instrumentation to Characterize Nuclear Pb-Pb Collisions at the LHC for the Study of the Quark Gluon Plasma



The Large Hadron Collider, LHC, near Geneva, Switzerland





Absorber with ATLAS Zero Degree Calorimeter inside LHC tunnel

Michael Murray, Riccardo Longo and MGP at the ATLAS ZDC

The Physics 280 Web Site

The Physics 280 web site is the “Information Center” for this course
A first writing assignment, RE1 has been posted.

http://courses.physics.illinois.edu/phys280/sp2020/index.html

➔ ***instructions related to essay writing and submission will be followed very closely to emulate rules for technical writing.***

PHYS/GLBL 280 Subject ID for Email

If you send **e-mail: please start the subject line with**

20p280

This sorts 280 e-mail in my “280 folder and will allow me to respond promptly.

280 Lectures, Writing Labs, Office Hours

- Lectures: Tuesdays and Thursdays, 2:00-3.20pm
  - —Lectures slides posted on TopHat
  - —Videos, demos, Q&A, discussions of readings and current events
- Writing Labs: Mondays, starting 1-27.
  - —Explanation of the writing assignments
  - —Instruction and guidance on how to write for the course
  - —Writing exercises, discussion of readings and current events, assessments
  - —Help in revising first versions of assignment
- Office Hours: Wednesday 4 pm to 7 pm in Grainger Library, starting 1-29, next week.

280 – Required Reading

Required Textbooks

- *What Terrorists Want,* by Louise Richardson (paperback)

Required Online Readings

- Selections from *The Day After Midnight: The Effects of Nuclear War*
  (available as a PDF file on the P280 'Documents' page)
- *Preventing Catastrophic Nuclear Terrorism*, by Charles Ferguson
  (available as a PDF file on the P280 'Documents' page)
- *The Gravest Danger*, by Sidney D. Drell and James E. Goodby
  (available as a PDF file on the P280 'Documents' page)

280 – Recommended Reading

Recommended texts:

(1) Alred, Gerald J., Oliu, Walter E., and Brusaw, Charles T. *The Handbook of Technical Writing*, 12th edition. New York: Bedford/St. Martin's, 2018.
e-book ISBN: 9781319107345
6-month e-book rental: $34.99 (or purchase: $50.99) direct from publisher:
https://www.macmillanlearning.com/college/us/product/Handbook-of-Technical-Writing/p/1319058523.
9th edition on reserve at Grainger Engineering Library

(2) Booth, Wayne C., Colomb, Gregory G., Williams, Joseph M., Bizup, Joseph, and FitzGerald, William T. *The Craft of Research*, 4th edition. Chicago: University of Chicago Press, 2016.
e-book ISBN: 9780226239873
available direct from publisher:
$18.00: https://www.press.uchicago.edu/ucp/books/book/chicago/C/bo23521678.html.
3rd edition on reserve at Grainger Engineering Library

3) John A. Lynn II *Another Kind of War, The Nature and History of Terrorism,*
Yale University Press
ISBN 978-0-300-18881-3

Follow the News related to Nuclear Arms and Arms Control !

- Follow the news media with regards to topics related to the course (eg. North Korea, Iran Nuclear Deal etc.)
- *Bring questions and interesting articles to class to share!*
- *We will start class by briefly presenting and discussing current related news.*

280 Writing Assignments - 1

280 is an Advanced Composition Course

- Previous credit for a Composition course is a prerequisite

280 has three types of Required Writings

- Required essays
- Research paper proposal
- Research paper
- Writing assignments will be due electronically by 10pm on Wednesdays. The first essay, required essay 1 (RE1), will be due next week on Wednesday, 1-29 at 10 pm. A paper copy will be due at the beginning of class on Thursdays.

The late deadline will be Friday at 4.00 pm electronically, (paper copy to be deposited in the yellow 280 homework box in the “interpass” between Loomis and MRL).

280 Writing Assignments - 2

- We strictly enforce the UI's rules on academic integrity
  - — All writing assignments are scanned using plagiarism detection software We use Turnitin including a library of all PHYS/GLBL 280 essays submitted in the past.
- Four Required Essays, RE1, RE2v1, RE2v2, …, RE4v2
  - — Essays 2-4 will be revised and re-submitted
  - — Peer review v1 essay's of your co-students
  - — Both versions count equally
  - — There are penalties for late submissions

280 Writing Assignments -3

- *Research Paper Proposal (2 pages)*
  - The topic will be chosen in consultation with your TA
  - Your proposal must be approved in advance by your TA
  - Your paper must address both technical and policy aspects of some issue (but the weights need not be 50–50)
  - Your scores on the first and second versions count equally
- *Research Paper (7–10 pages)*
  - Scores on the first and second versions count equally
- *Optional Extra Credit Essay (about 1.5 pages)*
- *Writing Lab participation counts 6% of your writing grade*

Timeline for Physics/Global Studies 280

The Timeline is available on course webpage:

https://courses.physics.illinois.edu/phys280/sp2020/schedule.html

280 – Midterm + Final

- Mid-Term Exam: 2:00–3:20 p.m., (March 26th)
  - — Location TBD (*it will not be in this room)*
  - — Closed book
  - — Tests factual knowledge and understanding
  - — Includes essay question

- Final Exam: (time TBD)
  - — Location TBD (*it will not be in this room)*
  - — Closed book
  - — Tests factual knowledge and understanding
  - — Includes essay question
  - — The final exam will emphasize material presented after the mid-term exam

Top Hat for Slides and Lecture Questions

We will post lecture question

- to encourage and facilitate discussion and interaction
- to poll you about your experiences and opinions
- to monitor attendance

Grading of lecture questions

- 50% for participation and 50% for correct answer

TopHat will send out invitations!

280 – Grading Scheme

Writing Component

Required essays (7 essays)	34%
Research paper proposals and research papers	30%
Writing Lab participation	6%
Extra credit essay	2%

Exam Component

Midterm exam	10%
Final exam	15%
Lecture-Discussion questions	8%

280 – Grade Boundaries

A+	95-100
A	90-94
A-	85-89
B+	80-84
B	75-79
B-	70-74
C+	65-69
C	60-64
C-	55-59
D	<55

The Beginning of The Atomic Age

Video "Atomic Bomb" (PBS),

Part 1

Physics/Global Studies 280: Session 2

Announcements and questions

Current Events

Video “Atomic Bomb” (PBS), Part 2

280: Announcements

First Writing Lab Sessions: Monday, January-27
First office hours: Wednesday, January-29 – Grainger 402, 4-7pm

Course news available on course web-page

News

Doomsday Clock is 100 seconds to midnight, the symbolic hour of the apocalypse

The Washington Post, January 23rd, 2020

By Hannah Knowles and
Abby Ohlheiser
January 23 at 11:00 AM

The Bulletin of the Atomic Scientists is moving the Doomsday Clock up to 100 seconds to midnight — a metaphor for the end of the world — in a recognition of growing threats from nuclear war, climate change and disinformation.

The clock had been at two minutes to midnight since 2018. Now, the looming dangers are captured in a smaller unit in a testament to the need for urgent action, the Bulletin said Thursday, as its president warned of influential leaders who "denigrate and discard the most effective methods for addressing complex threats."

The latest jump closer to midnight "signals really bad news," said astrophysicist Robert Rosner, part of the Bulletin's Science and Security Board. "What we said last year is now a disturbing reality in that things are not getting better."

The group's reasoning has traditionally focused on the availability of nuclear weapons and a willingness among the world's great powers to use them, and members of the Bulletin's Science and Security Board pointed this year to a host of concerning developments — including the prospect of a deal limiting Iran's nuclear development completely falling apart, after Iran began reducing its compliance following the U.S.'s withdrawal under President Trump.

In North Korea, meanwhile, there's been "no real progress" despite fanfare over talks, said Sharon Squassoni, a professor at George Washington University and Science and Security Board member. And North Korean leader Kim Jong Un has promised to demonstrate a new weapon.

News

Doomsday Clock is 100 seconds to midnight, the symbolic hour of the apocalypse

The Washington Post, January 23rd, 2020

By Hannah Knowles and
Abby Ohlheiser
January 23 at 11:00 AM

Thursday's announcement also underscored changes over the years in the threats tracked by the Doomsday Clock, as the Bulletin's scientists express growing concern about the state of the planet. They warned in 2007 that the threat of climate change is "nearly as dire" as the dangers of nuclear weapons.

And those twin problems "are compounded by a threat multiplier, cyber-enabled information warfare, that undercuts society's ability to respond," the Bulletin said in its statement this year. It said many governments have used disinformation campaigns over the last year to "sow distrust in institutions and among nations."

"The international security situation is dire, not just because these threats exist, but because world leaders have allowed the international political infrastructure for managing them to erode," the group warned.

Former California governor Jerry Brown, the Bulletin's executive chair, emphasized the confluence of concerns in a statement.

"Dangerous rivalry and hostility among the superpowers increases the likelihood of nuclear blunder," he said. "Climate change just compounds the crisis. If there's ever a time to wake up, it's now."

News

Doomsday Clock is 100 seconds to midnight, the symbolic hour of the apocalypse

The Washington Post, January 23rd, 2020

The clock, a metaphorical measure for humankind's proximity to destruction, has wavered between two and 17 minutes to the apocalypse since its inception in 1947.

The Bulletin of the Atomic Scientists was founded by veterans of the Manhattan Project who were concerned about the consequences of their nuclear research. One of them, nuclear physicist Alexander Langsdorf, was married to artist Martyl Langsdorf, who created the clock and set it at seven minutes to midnight, or 11:53, for the cover of the group's magazine. Her husband moved the time four minutes ahead in 1949.Since then, the Bulletin's board has determined how far the clock's minute hand will move, usually to draw attention to worldwide crises that it believes threaten the survival of the human species.

Last year, the clock didn't budge, remaining at two minutes to "midnight" after advancing 30 seconds in 2018. It had also advanced 30 seconds in 2017 but did not move at all in 2016.

The decision to move up the time on the clock in 2018 was motivated largely by the Bulletin's sense of looming nuclear peril. It listed a series of grim developments: North Korea had made rapid progress in developing a thermonuclear weapon capable of reaching the United States. Relations between the United States and Russia had deteriorated, with no high-level armscontrol negotiations happening between the two countries. And nations around the world were moving to modernize and enhance their nuclear arsenals.

In addition, the organization cited unchecked artificial intelligence, the alarming spread of disinformation and the public's eroding trust in institutions.

MGF

IT IS 100 SECONDS TO MIDNIGHT

News

Doomsday Clock is 100 seconds to midnight, the symbolic hour of the apocalypse

The Washington Post, January 23rd, 2020

The group said last year that although the scientists noted an upsetting change in the information ecosystem in 2018, they did not see a “qualitative” change with other threats that would have warranted resetting the time on the clock.

But Bulletin President Rachel Bronson told reporters that the clock’s lack of movement reflected a “new abnormal” and “should not be taken as a sign of stability but as a stark warning.”

News

OPINION | COMMENTARY

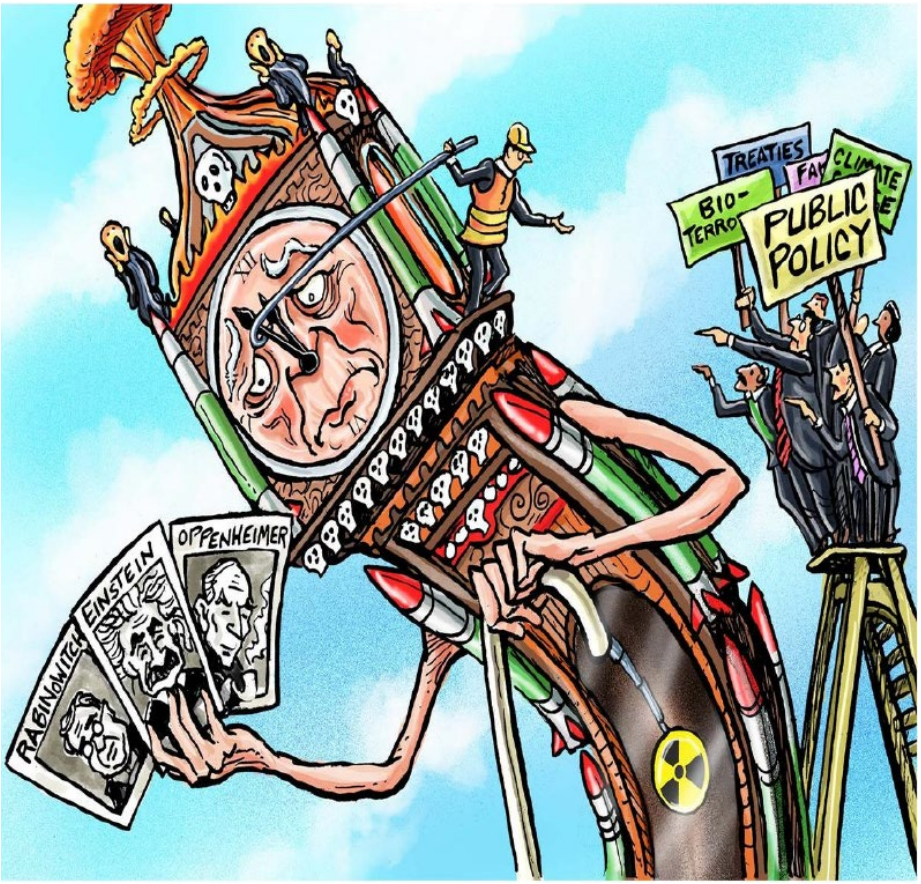
Time to Stop the 'Doomsday Clock'

'Atomic scientists' have no special authority when they opine on politics or military strategy.

By Lawrence M. Krauss

Jan. 22, 2020 6:15 pm ET

Wallstreet Journal, January 22nd, 2020



The Bulletin of the Atomic Scientists is resetting its "Doomsday Clock," which has stood still since 2018 at two minutes to midnight. I was a member of the Bulletin's Board of Sponsors for a dozen years and chaired it from 2009 through 2018, and I think it's time to retire the clock. The Bulletin was founded by group of scientists who had participated in the Manhattan Project and wanted to inform the public about the dangers of nuclear weapons. The clock, set at seven minutes to midnight, appeared on the cover of its first issue in 1947. Albert Einstein and J. Robert Oppenheimer set up the Board of Sponsors in 1948 to help guide setting the clock's time. "The Bulletin's Clock is not a gauge to register the ups and downs of the international power struggle,"

OPINION | COMMENTARY

Wallstreet Journal, January 22nd, 2020

News

Time to Stop the 'Doomsday Clock'

'Atomic scientists' have no special authority when they opine on politics or military strategy.

founding editor Eugene Rabinowitch explained. "It is intended to reflect basic changes in the level of continuous danger in which mankind lives in the nuclear age."

Early on, it often did. It moved forward in 1953, after the U.S. and the Soviet Union developed the hydrogen bomb, or in 1974, when missiles with multiple warheads became a reality. But gradually it broadened focus beyond the physical dangers of nuclear weapons and began taking account of political questions such as arms-control treaties and tensions between India and Pakistan, and, since 2007, of other military threats such as bioterrorism, as well as the global existential dangers of climate change. The 2019 announcement also cited "fake news" and Donald Trump. This multiplication of threats has heightened the sense of alarm. The Doomsday Clock time is now much closer to midnight than it was during the Cuban Missile Crisis (seven minutes), when the world really was on the precipice of a nuclear holocaust. At the same time, a clock that has moved back and forth while lingering frighteningly close to midnight for more than 70 years strikes many as crying wolf. At two minutes to midnight, the clock can't move much further forward, even if threats increase. More to the point, the threats the clock now purports to measure are different in kind. Nuclear weapons could end human civilization in a day. The generation of greenhouse gases associated with human industrial activity won't. It is increasingly likely to have devastating impacts, but these will emerge over the long term and be spread unevenly across the globe. Psychologist Steven Pinker argues—and the bulletin admits—that the clock is anything but a scientific instrument. In Mr. Pinker's view, the annual announcement is a publicity stunt that demeans the scientific community and makes the world seem more dangerous than it actually is.

News

OPINION | COMMENTARY

Wallstreet Journal, January 22nd, 2020

Time to Stop the 'Doomsday Clock'

'Atomic scientists' have no special authority when they opine on politics or military strategy.

The clock *is* a publicity stunt—and a successful one. That was the point. The public hardly ever debates the ever-present danger of a world with 10,000 nuclear weapons. People would rather not think about it. Yet there's a deeper problem. Not only is the Doomsday Clock unscientific; the factors of its setting are now dominated more by policy questions than scientific ones. The former may be important, but claiming the authority of "atomic scientists" is appropriate only for the latter. Atomic scientists can speak with authority—as Rabinowitch, Einstein and Oppenheimer did—to the technical capabilities of nuclear weapons. Scientists' views may also carry special weight when they raise concerns about the global climate consequences of rising CO2 levels or of a regional nuclear conflict, or the technological challenges of proposed missile-defense systems, or government censorship or distortion of scientific research. But today the clock's setting is determined more by concerns about how superpowers can engage in arms-control talks, about potentially reckless statements by world leaders, or about what policies would best reduce carbon emissions. These are important questions, but not ones on which scientists can claim special authority. The group announcing the clock reset includes a former president of Ireland, a former United Nations secretary-general and members of the Elders, an organization founded by Nelson Mandela that describes itself as "independent global leaders working together for peace and human rights." These like-minded people—along with various intelligence and climate policy experts, and one atomic scientist—can make informed recommendations, and I largely agree with them. But this is public policy, not science.

News

OPINION | COMMENTARY

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So why not retire the clock? An icon with some fixed value, say, five minutes to midnight, might serve as a permanent reminder of a dangerous world. Nuclear weapons aren't disappearing any time soon, and climate change is already occurring on a massive scale. Other threats will emerge, even as technology creates opportunities for revolutionary improvements in the human condition.

The Bulletin of Atomic Scientists can continue to play a useful role by focusing on providing accurate information on technology and science to be used as a basis for public policy. Or it could rename itself The Bulletin, acknowledge that it is an advocacy organization, and make the best case for its well-intentioned proposals.

Mr. Krauss, a theoretical physicist, was the chairman of the Board of Sponsors of the Bulletin of the Atomic Scientists, 2009-18. He is president of the Origins Project Foundation and host of "The Origins Podcast With Lawrence Krauss."

News

The New York Times | https://nyti.ms/2G40lwm

Arizona State Suspends Lawrence Krauss During Inquiry Over Sexual Misconduct Accusations

By Kenneth Chang

March 7, 2018

Arizona State University has suspended Lawrence M. Krauss, a prominent theoretical physicist, while the university investigates accusations of sexual misconduct over a decade.

"In an effort to avoid further disruption to the normal course of business as the university continues to gather facts about the allegations, Krauss has been placed on paid leave and is prohibited from being on campus for the duration of the review," the university said in a statement released on Tuesday.

Last month, BuzzFeed reported that several women have accused Dr. Krauss of inappropriate behavior including groping women and making sexist jokes.

The university said it would not release any additional details until its investigation is complete.

Dr. Krauss, a professor in the university's School of Earth and Space Exploration, is director of Arizona State's Origins Project, a multidisciplinary research effort to tackle questions about life, the universe and complex social problems. He gained prominence for his book, "The Physics of Star Trek" in 1995. He later became one of the leaders of the so-called "skeptics" movement that espouses science over religion. He has also written essays and Op-Ed articles that were published in The Times.

Michael Crow, president of Arizona State, told The State Press, an independent student news organization, that the university had received no complaints of harassment against Dr. Krauss. The university started the investigation after being contacted by BuzzFeed.

News

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Dr. Krauss moved to Arizona State from Case Western Reserve University in Ohio in 2008.
On Wednesday afternoon, Dr. Krauss posted a lengthy rebuttal to the BuzzFeed article. He said many of the incidents reported by BuzzFeed were based on unsubstantiated rumors and others were distorted and misleading. "Has my language or demeanor sometimes made others feel uncomfortable?" Dr. Krauss wrote. "Clearly yes, and for that I sincerely apologize. Nevertheless, the BuzzFeed article effectively paints a false picture of me and my relationships with others through a mosaic constructed largely out of anonymous hearsay and a web of often vague innuendo." The university is not the only one to take action against Dr. Krauss. The American Physical Society and other organizations have withdrawn invitations to Dr. Krauss for upcoming talks. The Center for Inquiry, an organization that promotes secularism, suspended its association with Dr. Krauss on Monday.

On Tuesday, Dr. Krauss resigned from the board of the Bulletin of the Atomic Scientists, which is best known for its Doomsday Clock that represents that danger of atomic war and other calamities to the planet. In his resignation letter, he said he was resigning from the board because he did not want to distract from the organization's work. Additionally, a conference scheduled for next month to mark the 10th anniversary of the Origins Project has been canceled. "What we hope to do is reschedule it for another time," Dr. Krauss said in an interview on Wednesday.

The Beginning of the Atomic Age

PBS Video

“Atomic Bomb”, Part 2

Physics/Global Studies 280: Session 3

Your RE1 must be turned in online
on Wednesday by 10 pm, January 29th (tomorrow)
(paper copy at the beginning of class in class!)

Plan for This Session

- Q&A + News
- Video “Atomic Bomb” (PBS), Part 3
- Discussion of the video

Physics 280: Session 3

Announcements About The Course

First reading assignment have been due.
Next two Assignments on 2-3 and 2-10
http://courses.physics.illinois.edu/phys280/sp2020/reading.html

There will be 5 quizzes with 5 questions at random writing labs on the reading material. 4 or 5 correct answers will result into full credit for the writing lab participation points. 3 correct answers in 50% of the participation points for the writing lab.

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Questions About The Course

News India Conducts Second January 2020 Submarine-Launched Ballistic Missile Test

THE | DIPLOMAT

ASIA DEFENSE | SECURITY | SOUTH ASIA

By Ankit Panda

January 27, 2020

Another K-4 submarine launched ballistic missile was successfully tested.

For the second time in six days, India conducted a test-launch of its longest-range submarine launched ballistic missile, the K-4, from an underwater pontoon. The test was the second this month, with another taking place on January 19. Like the first test, the second K-4 launch was reported to have been successful. "The K-4 is now virtually ready for its serial production to kick-off. The two tests have demonstrated its capability to emerge straight from underwater and undertake its parabolic trajectory," said an official source cited by the Times of India.

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News India Conducts Second January 2020 Submarine-Launched Ballistic Missile Test

THE | DIPLOMAT

ASIA DEFENSE | SECURITY | SOUTH ASIA

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January 27, 2020

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The test took place in the Bay of Bengal, off the coast of the Indian state of Andhra Pradesh, near Vizag, and was overseen by the Defense Research and Development Organization (DRDO), the Indian government's agency for the development of indigenous weapons systems. A nuclear-capable missile, the K-4 will eventually arm India's fleet of nuclear-propelled ballistic missile submarines. Currently, a single Indian ballistic missile submarine, INS *Arihant*, is operational. The K-4 is reported to have a range capability of around 3,500 kilometers. Aside from the K-4, India has also developed the K-15 Sagarika short-range submarine-launched ballistic missile. Also nuclear-capable, the Sagarika has an estimated range capability of 700 kilometers. The Sagarika is primarily positioned to hold targets in southern Pakistan, including Karachi, at risk from the Sea.

The Beginning of the Atomic Age

Video

“Atomic Bomb”, Part 3

Beginnings: PBS Documentary “The Atomic Bomb”

Discussion

Which issues related to nuclear weapons do you consider most important? Answers not limited to but may include:

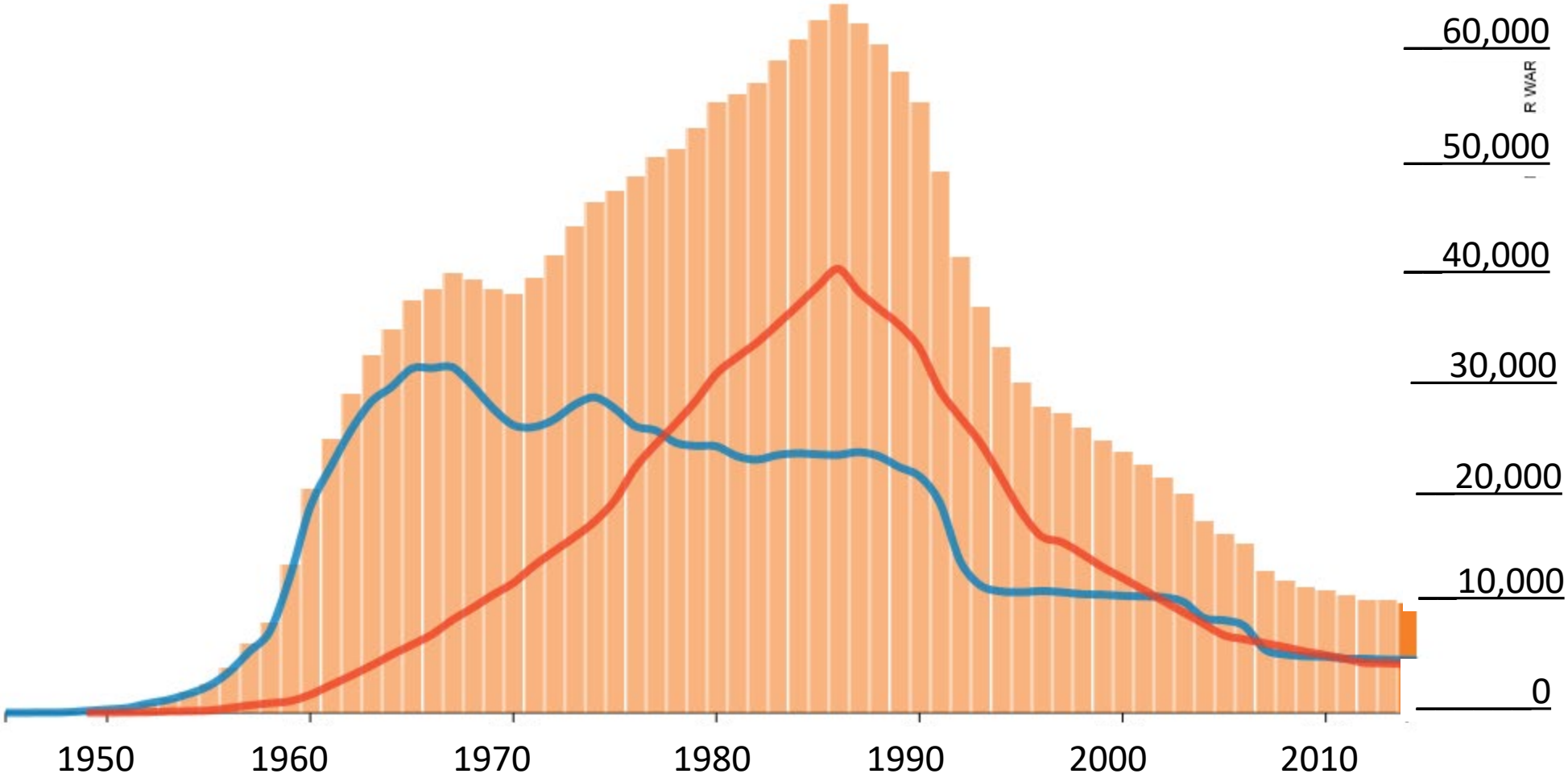
o risk of accidental nuclear war between major nuclear powers
o threat from nuclear armed North Korea
o nuclear program in Iran
o US nuclear armament insufficient for effective deterrence
o proliferation to additional countries (eg. South Korea, Saudi Arabia)
o theft of nuclear materials by terrorist groups/nuclear terrorism
o need for modernization of nuclear armament
o cost of operating and modernizing nuclear arsenals
o environmental impact of nuclear arms production

Nuclear Powers: First Weapon Tests

The year each declared nuclear weapon state first tested a nuclear device:

United States:	1945
Soviet Union:	1949
United Kingdom:	1952
France:	1960
China:	1964
India:	1974 (1998)
Pakistan:	1998
North Korea:	2006

World Nuclear Weapon Stockpiles 1945–2014



Source: *The Bulletin of Atomic Scientists'* Nuclear Notebook, written by Hans M. Kristensen and Robert S. Norris, Federation of American Scientists http://thebulleting.org/nuclear-notebook-nultimedia

End of Introduction to Physics 280