

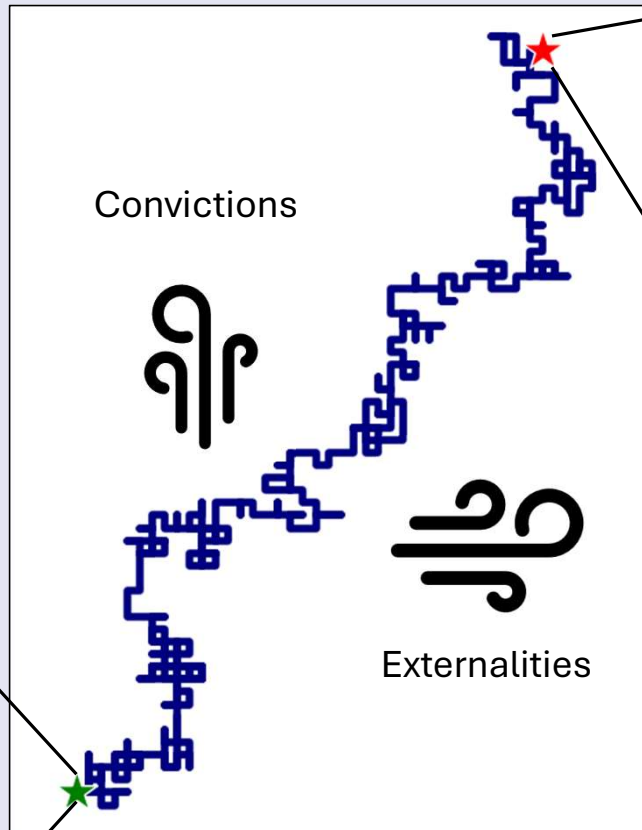
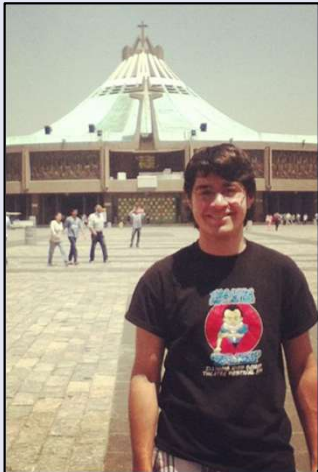
A wide-angle photograph of the Machu Picchu archaeological site in Peru. The foreground shows the stone ruins of the city, including a large grassy area and a tree on the left. The background is dominated by steep, forested mountains with patches of white clouds or mist clinging to their slopes. The sky is overcast.

Rewriting My Trajectory: Reflections on Moving from Physics to Policy

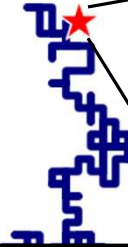
By Rodrigo Araiza Bravo, PhD

UIUC Physics Department Career Seminar

June 30, 2024



Internal
winds



“Let me tell you a story...”



– Sen. Dick Durbin



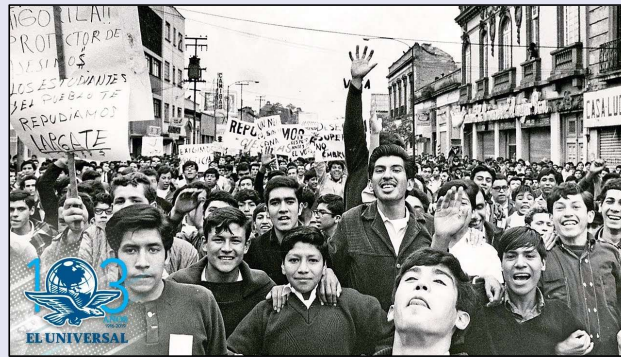
Outline

- Wandering to and through science
- Wandering to and through science policy
- Scientists in the US Congress
- Tips for engaging with policy

Outline

- Wandering to and through science
- Wandering to and through science policy
- Scientists in the US Congress
- Tips for engaging with policy

My background



Instituto Politécnico Nacional
"La Técnica al Servicio de la Patria"


"I love anything involving math and science, and becoming an engineer is my dream. At CLC, I found a way to achieve my ambition."

Engineering student Oscar Bravo has been accepted into CLC's Pathways to Engineering partnership with the University of Illinois at Urbana-Champaign. If he keeps his grades up, he'll be accepted as a junior into U of I's College of Engineering.

Do you want a career in science, technology or engineering—the "STEM" fields?

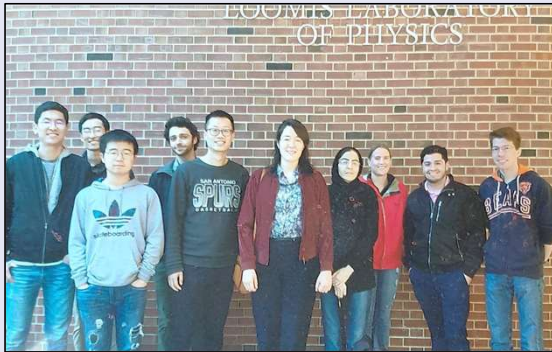
CLC offers paths to these careers:

- Transfer majors in mathematics, computer science and information technology, physics, chemistry, biological sciences and engineering.
- A "Pathways to Engineering" program guaranteeing qualifying students admission to the University of Illinois College of Engineering as juniors after completing two years at CLC.

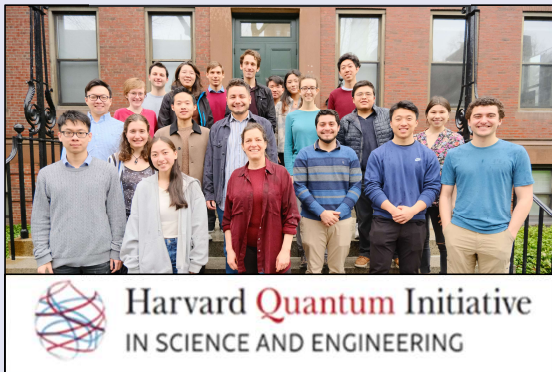


- Born in Mexico to a family of engineers/entrepreneurs/activists
- Growing up, science was at the service of people
- Moved to Mundelein, IL at 16 and went to community college at College of Lake County before transferring to UIUC

My Science Journey



Lorenz Group, 2018



Yelin Group, Harvard, 2024

Goal: Overcoming noise in a quantum network
Yujie Zhang, RAB *et al* 2020, *New J. Phys.* **22** 043003



Goal: Using neutral atoms for machine learning tasks
RAB *et al* 2022, *PRX Quantum* **3** 030325
RAB *et al* 2024, *Quantum Sci. Technol.* **10** 015063



Goal: Using neutral atoms to simulate molecules with
eventual applications in photovoltaics and carbon capture
N. Maskara, RAB, *et al* 2025, *Nature Physics* **21** 289-297



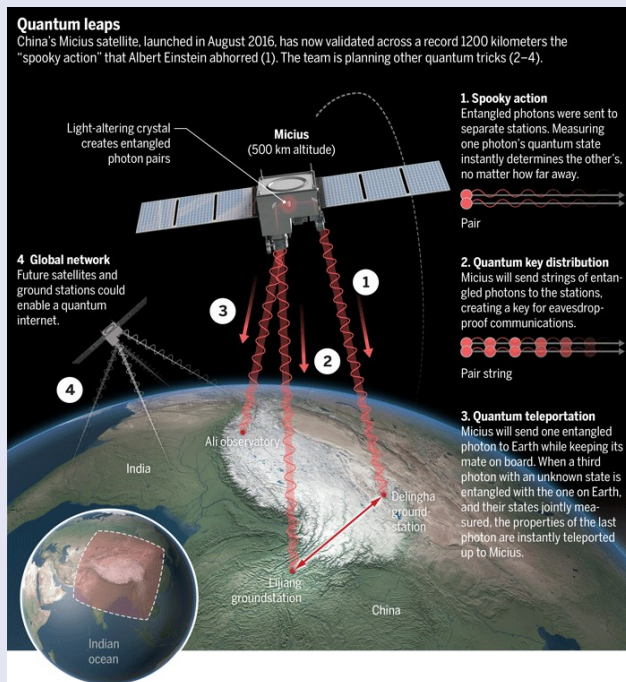
Goal: Ensuring neutral atoms are efficiently
trainable to solve chemistry problems
RAB *et al* 2024, *APL Quantum* **1** 046121



Outline

- Wandering to and through science
- Wandering to and through science policy
- Scientists in the US Congress
- Tips for engaging with policy

Rising Interests in Quantum Information...



Mucius Satellite, 2016



National Quantum Initiative, 2018

“Quantum research will address fundamental research gaps, create a stronger workforce, and generate transformative innovation to give U.S. companies and workers a competitive advantage.” – Rep. Smith (R-Tx)



Our World, Our Science



Early on in graduate school, I realized that science-making is not just about personal convictions, but hinges on external factors such as a good working environment where we feel valued.

I wanted to help those around me feel more at home!

**Proclamation on the Suspension
of Entry as Nonimmigrants of
Certain Students and Researchers
from the People's Republic of
China**

— NATIONAL SECURITY & DEFENSE | Issued on: May 29, 2020



Making Science More Inclusive



- **Diversify Advocate**
 - Encouraging gender minorities to apply to grad school
 - Mentored students of color and attended minority conferences
 - Chair of the Engagement Committee at Harvard-MIT CUA
- **Volunteer:**
 - Grad student union (elected rep, picket line leader, etc.)
 - Providing food and blankets to the unhoused folks around Harvard
- **Teacher:**
 - Quantum topics for children at the Boston Museum of Science
 - Ethics of quantum computing modules during undergrad classes
- **Leader:**
 - Cofounded a project to raise awareness on the ethics of quantum technologies
 - Cofounded a student group at Harvard to discuss the responsible innovation of quantum technologies
 - Briefed government officials on the ethics of quantum
- **Student:**
 - Secondary field on Science and Technology Studies
 - Incorporated ethics into my research
- **Worker:**
 - Helped IBM stand up responsible quantum computing principles

Making Science More Inclusive

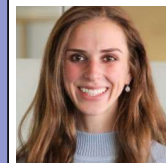
- Diversify Advocate



Much of this work was me wandering to define exactly *how* I wanted to help others!

It also allowed me to build a network of like-minded people, some of whom pointed me to Science Policy...

U.S. Quantum Policy in Light of China

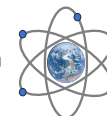


A roundtable discussion with Sam Howell

Wednesday, October 18th
4:30 – 6:00 pm in LISE 300



Center for a
New American
Security



Harvard GSAS
Quantum Science
and Society
Student Group

Post-Ph. D. Science Policy Fellowships



Science

- Internships, fellowships, jobs
- US, UK, Canada, Europe
- Government, Academia, Industry



- Applications open around July
- Due early November
 - Exec branch fellows apply to AAAS
 - Leg branch fellows apply to AAAS and professional societies
- Interviews in Feb-March
- Fellowship Sept-Sept
- ~80K stipend for leg branch, ~100K stipend for exec branch

Why did I want to do the fellowship?



Externalities



NQI is up for renewal,
and I have ideas on
how to improve it!



A transition was on the
horizon; help needed
either way

- Wanted to highlight ethics
- Career pivot (tired of being in an academic silo)
- I knew I wanted to learn orthogonal skill sets

Convictions



Outline

- Wandering to and through science
- Wandering to and through science policy
- **Scientists in the US Congress**
- Tips for engaging with policy

My Portfolio



AUGUST 01, 2024

Durbin, Daines Introduce Bipartisan Legislation To Fund The Future Of Quantum Research At DOE



Technical assistance and legislative research/advocacy on quantum policy

Science funding issues: NSF, DOE, NIST

Energy issues: clean energy, carbon capture,

Nuts and bolts:

- 9-5 (recess) or 9-6 (session) schedule
 - WFH twice a week
 - 84K stipend
- Serving comes with stress

development

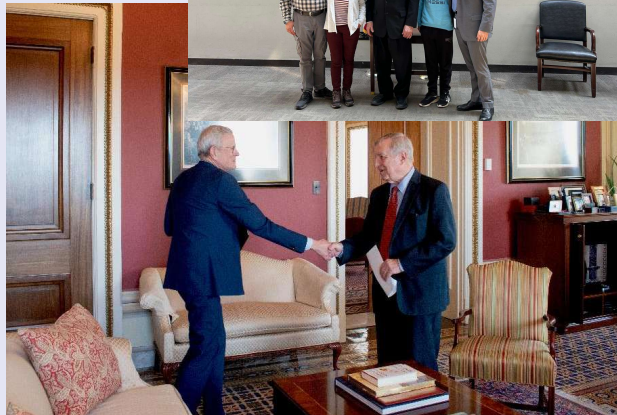
ation and

My Responsibilities



Writing

- Legislative text
- One-pagers/summaries
- Vote recommendations
- Talking points
- Hearing remarks
- Oversight letters



Meetings

- Staffing the Senator
- Constituent engagement
- Engaging with the congressional delegation
- Organizing informational events



Coalition Building

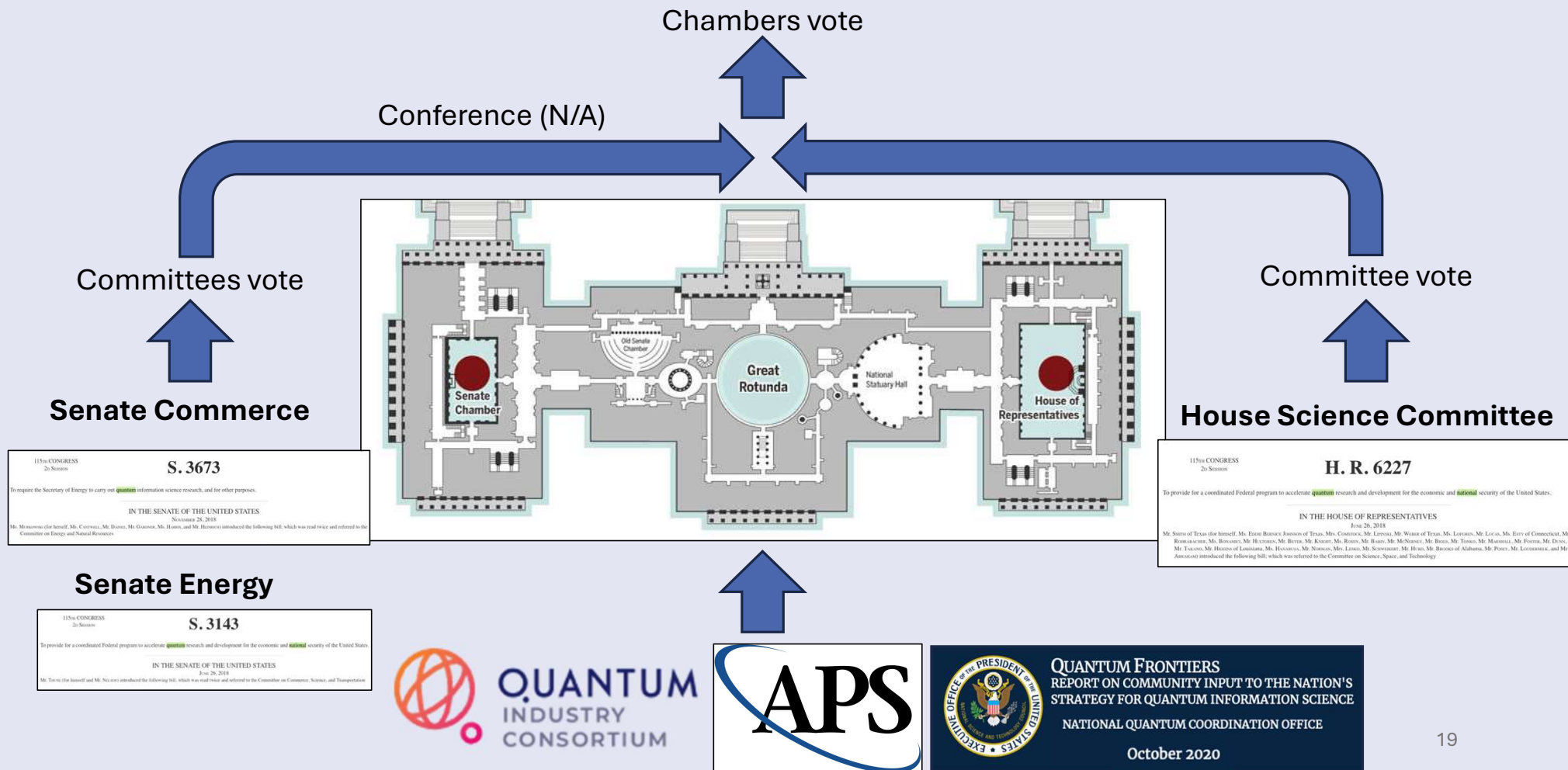
- With congressional partners
- Cosponsoring bills and letters
- Drafting joint amendments
- Appropriation letter requests

⟨Science|Politics⟩

- The ***America Innovation Act*** would secure 5% real growth to the basic science budgets at five agencies, including NSF.
- The bipartisan ***Keep STEM Talent Act*** would streamline access to permanent residence for international STEM students in U.S. universities.
- The bipartisan ***DOE Quantum Leadership Act*** would reinvigorate and improve authorizations of quantum information science, engineering, and technology activities at the DOE.



Moving the NQI – First authorization in 2018



Reauthorization of the NQI (2022-2024)

*“To ensure quantum information science, technology, and engineering research move **beyond basic science** and into use-inspired research, demonstration, and commercialization.”*

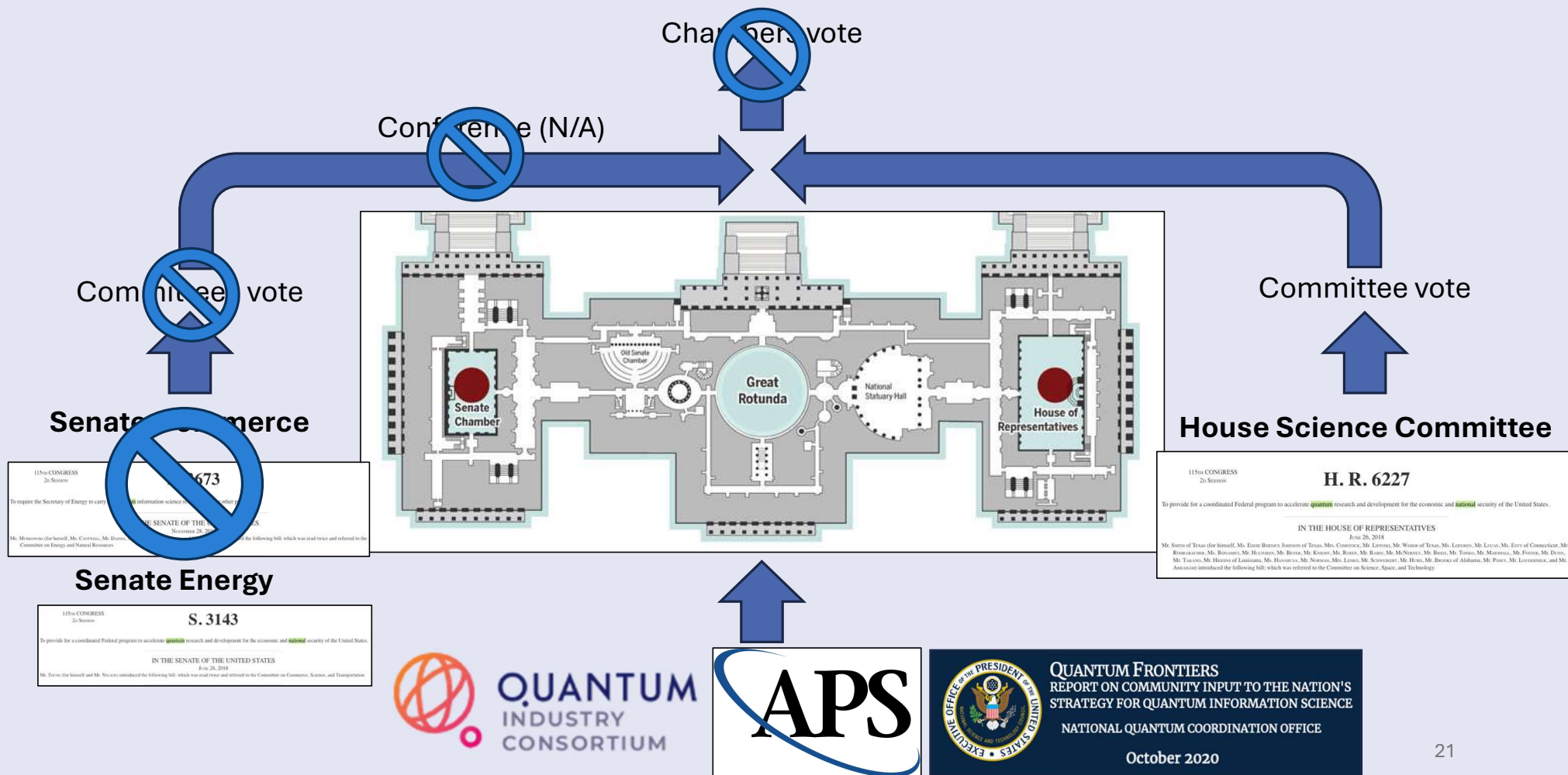
Senate Proposal

Agency	Mission	Authorizing funding
OSTP	Coordinating Office	No change
NIST	R&D, Post-quantum cryptography, three research centers	\$80M/year \$100M/year
NSF	R&D, workforce development consortium , research centers, testbeds	\$10M/year/center \$190M/year
DOE	R&D, research centers, and quantum networks, facilitate access, foundry , and workforce development	~\$250M/year ~\$420M/year
NASA	R&D and research institute	\$45M/year
NIH	R&D	N/A
DOS	Talent exchange program	N/A

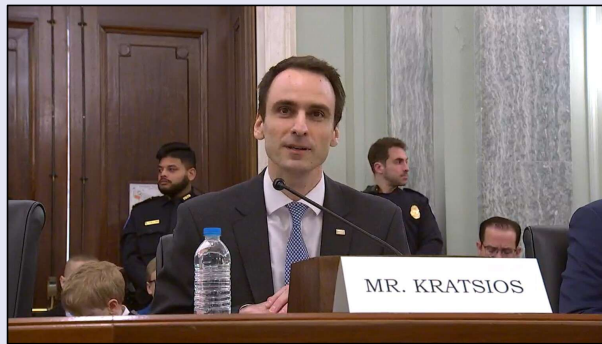
House Proposal

Agency	Mission	Authorizing funding
OSTP	Coordinating Office	N/A
NIST	R&D, Post-quantum cryptography, three research centers	\$80M/year \$85M/year
NSF	R&D, workforce development consortium , research centers, testbeds	\$10M/year/center \$141M/year
DOE	R&D, research centers, and quantum networks, facilitate access, foundry , and workforce development	~\$250M/year ~\$370M/year
NASA	R&D and research institute	\$25M/year

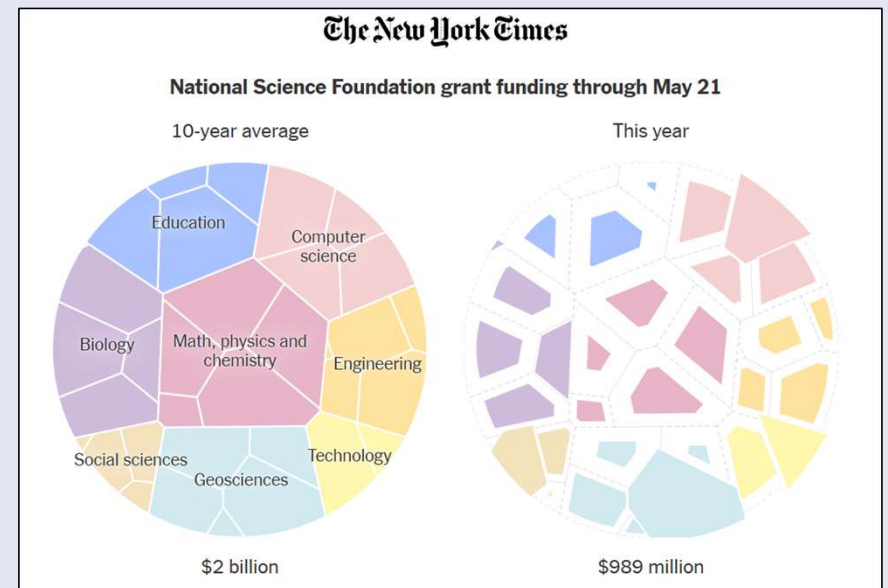
How did we (not) get there?



Pending businesses



- The Administration claims quantum is a priority
- House Republicans have signaled that they will soon reintroduce the NQI, but the Senate is slower.
- However, while quantum is a priority, other areas of the science enterprise are experiencing hardships.



What's Next?

- If asked in 2024, I'd say I wanted to be in D.C.
- Missing my family and partner, as well as my continued interest in quantum policy, prompted me to start looking elsewhere...



Illinois
Department of Commerce
& Economic Opportunity

“The future of quantum is here, and it’s in Illinois. With the support of our federal partners, Illinois’ quantum campus will generate the sort of competitive research that has driven our most important American innovations, all while injecting billions of dollars into our state’s economy and creating hundreds of local jobs.” –Gov. JB Pritzker, July 16, 2024

Outline

- Wandering to and through science
- Wandering to and through science policy
- Scientists in the US Congress
- Tips for engaging with policy

Why Do We Need to Speak Up?

- Scientific research leads to a healthier, safer, and more prosperous society
- Government-supported science serves the public

We need your story!



We Need Your Engagement

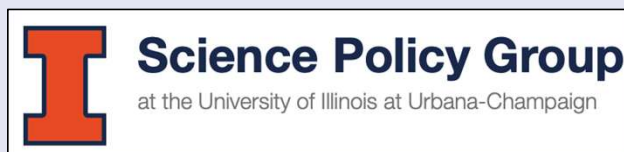
- Professional Societies



- Science/Physics Advocacy Groups



- Student Groups



Making Science Policy Your Next Step



Science

- Internships, fellowships, jobs
- US, UK, Canada, Europe
- Government, Academia, Industry



- Applications open around July
- Due early November
 - Exec branch fellows apply to AAAS
 - Leg branch fellows apply to AAAS and professional societies
- Interviews in Feb-March
- Fellowship Sept-Sept
- ~80K stipend for leg branch, ~100K stipend for exec branch

Wrapping up:

- Science is done by people for people, and policy is an aspect of science-making
- Scientists need to engage in today's world more than ever!
- Everyone's career path is shaped by unique random ventures, external factors, and your convictions... Enjoy the journey!

Thank you for listening!

Happy to answer any questions :)

Outline

• Lesson #1: We Make Science Possible

- NQI 2016 speech: quantum will do...
- Techno-determinism, the speech verges on it,
- Peeling away the curtain: scientists' role in advocating, political justifications, investing in people (IQUIST)
- Unionization: Harvard works because we do
- Moments of crisis: COVID-19, PP10043, losing our edge
- Debunking techno-determinism: quantum will... -> We will do, through quantum,...
- This part should cover the end of undergrad and the early part of grad school

• Lesson #2: Our Present is Our Science and Our Science is Our Future

- My research in STS -> sociotechnical imaginaries
- Dual-use technologies and the example of quantum: what will determine what way we go? Not a knife's edge, social forces push either way
- IBM Responsible QC as a tool to go one way and not the other
- AI energy usage, quantum energy usage, and resource-intensive: what future will we have?
- Quantum Ethics, Quantum Promises, Student Group, Deciding to go into policy -> end of grad school

• Lesson #3: Science Funding is not Gifted, It is Earned (should cover fellowship)

- Experts are policymakers (Oppenheimer), therefore, trust in science is also trust in institutions
- How is it earned on the Hill? Scientists as political actors
- Scientists talking to the Office: Dr. Kearns with RJD, IBM meeting
- Quote from RJD from this speech <https://www.durbin.senate.gov/newsroom/press-releases/durbin-shares-constituent-concerns-about-trumps-federal-funding-freeze>
- Translating science into policy action: renewal of the NQI, bills introduced (3), raising awareness of energy usage

• What can you do?

- Take care of each other
- Join a campaign (APS, UCS, Physics Coalition, etc.) or volunteer
- Write to your congresspeople (Durbin, Duckworth, and Budzinski have a "share your story page")
- Guide science in directions that produce a net positive

Title: Rewriting My Trajectory: Reflections on Moving from Physics to Policy

Abstract: When I graduated from UIUC nearly seven years ago, I was set on the traditional academic path: finish a PhD, land a postdoc, and eventually become a professor. But graduate school—especially during the COVID-19 pandemic—challenged those assumptions. Through organizing with the graduate student union and grappling with the broader impacts of my research, I began to see science not just as a technical pursuit, but as a deeply social one. I realized that if quantum technologies are to benefit humanity, we need to think critically about their development, use, and accessibility. After earning my degree, I took a less conventional route into science policy, where I now work on science and energy issues in the U.S. Congress. In this talk, I'll share my path from the lab to the legislature and reflect on why physicists are especially well-positioned to contribute to responsible innovation—and why your voice might be more needed than you think.

Bio: Rodrigo Araiza Bravo is an American Institute of Physics (AIP) Science and Engineering Congressional Policy Fellow, serving in the Office of Illinois Senator Dick Durbin on issues of science funding, STEM education, energy, and environmental policy. Before his current fellowship, Rodrigo co-founded two organizations to alert scientists about the ethical aspects of quantum technologies, helped stand up responsible quantum computing principles at IBM Quantum, and analyzed national quantum strategies around the world. Rodrigo earned his Ph.D. in quantum information theory from Harvard University in 2024, specializing in quantum variational algorithms.