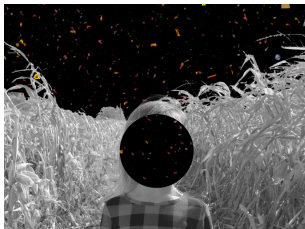


The Cautionary Tale of Russian Science

What happens when politics trumps science?

dzb

October 21, 2025



Outline (two-year update)

- 1 Context
- 2 My own personal connection to Russian/Soviet science: Zatsepin & Vavilov-Cherenkov
- 3 Two case studies of science vs. Dogma (Dialectical Materialism)
 - Lysenko (and consequences for Soviet agriculture)
 - rejection of Quantum Mechanics (and consequences for Soviet Nuclear Program)
- 4 Current Status in Russia and US
- 5 Fin

I. Contemporary Context: 8/7/25 Executive Order



-FY 2026 budget proposal calls for 55% cut to the NSF budget;
-2000 existing grants terminated since January 2025.

1. Prohibits any initiatives that promote 'anti-American values', or do not promote 'the President's policy priorities' (i.e., excise any text touting inclusion of minorities or women)
2. Shifts decision-making authority from proposal review panels to (Pres.-apptd.) administrators.

The great human tradition of the Cultural War

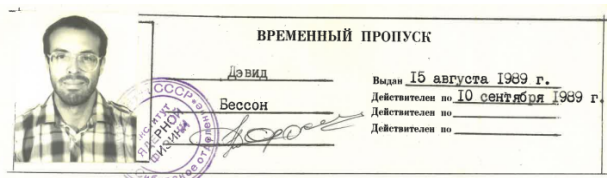
- Gaileo and the Jovian moons
- Giordano Bruno (“U is infinite”; “other Earths exist”; heliocentrism)
- ‘Jewish science’ in the 3rd Reich & Stalin



- Eugenics and US anti-wokeness: 1927 Buck v. Bell Supreme Court 8-1 ruling (Oliver Wendell Holmes) preventing procreation by the **manifestly unfit** (likened to compulsory vaccination as good for society)
Buck, mother and daughter “feeble-minded and promiscuous”. **“Three generations of imbeciles are enough”.**
- Govt. massaging the data (US Labor Statistics, “Raketi i ludey” (B. Chertok) Soviet Luna program)

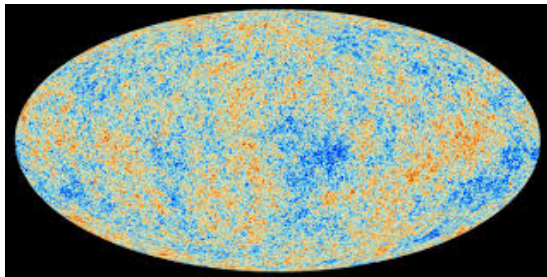
II. Me, Zatsepin & Vavilov

Zatsepin's seminar on the 'GZK cutoff' (August, 1989, the Budker Institute of Particle Physics, Akademgorodok, Novosibirsk)



Cosmic Microwave Background

Aside: What would the sky look like if our eyes were sensitive to light with wavelength $30000\times$ that of visible light (about 1 mm)?

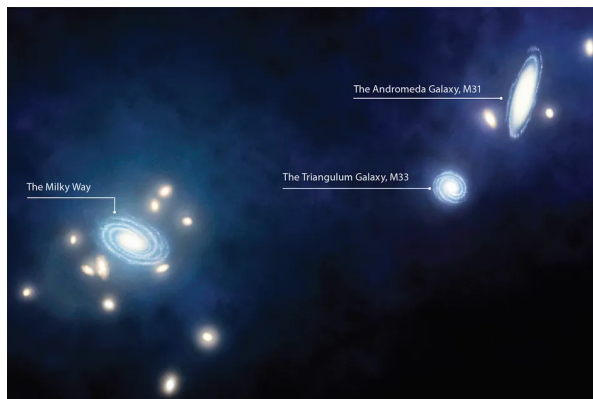


The Cosmic Microwave Background (CMB)

- Big Bang afterglow! Fills Universe out to (visible) limit
- Everywhere, including this room!

Aside: Size of the Universe

Distance from Milky Way \rightarrow Andromeda = 0.8 Megaparsecs

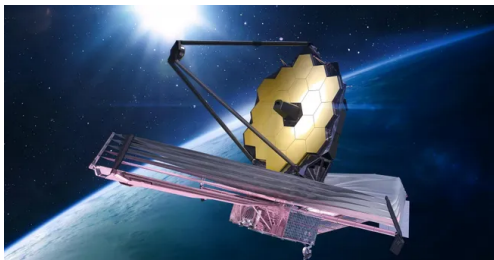


Zoom out: radius of visible universe about 28500 Megaparsecs!

Optical telescope=standard tool of astronomy



dzb

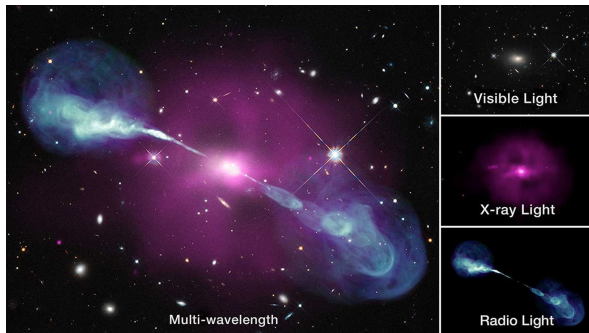


CREES

October 21, 2025

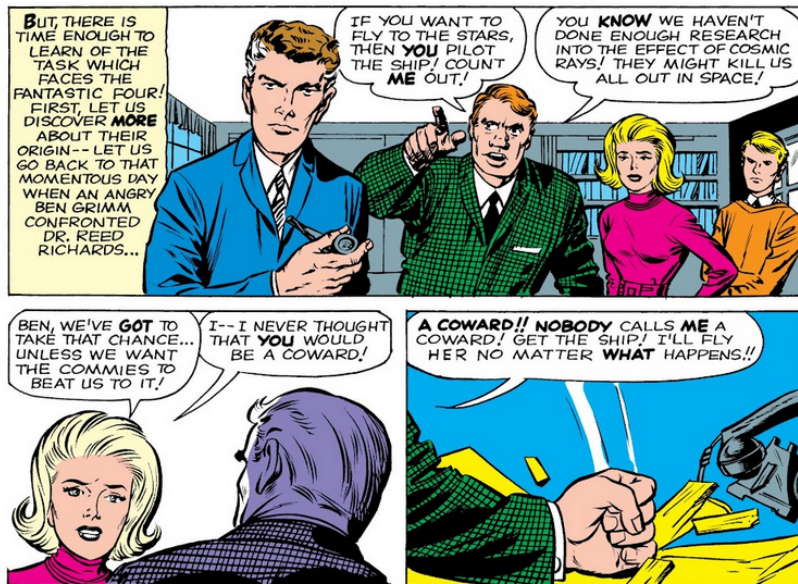
'Active Galactic Nucleus' within 10 Mpc of Earth

Billion-solar-mass
black-hole spitting out
light and particles!
-Harder to see distant
HIGH-ENERGY sources

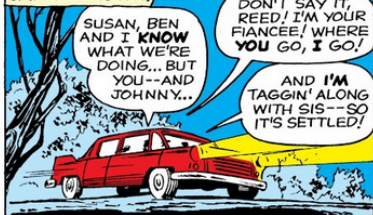


- The further the source, harder to penetrate the Cosmic Microwave Background fog before reaching our Earth-borne telescopes!
- Important point - in addition to light, AGN also produce High-Energy protons (one component of 'cosmic rays'))
- Energy of CERN's Large Hadron Collider packed into single particle trillionth of a mm in diameter
- What evidence do we have for cosmic rays???

Earliest documented US cosmic ray science (1961)



AND SO, LED BY A DETERMINED DR. REED RICHARDS, THE LITTLE GROUP SPED TOWARD THE SPACEPORT ON THE OUTSKIRTS OF TOWN!



SUSAN, BEN
AND I **KNOW**
WHAT WE'RE
DOING... BUT
YOU--AND
JOHNNY...

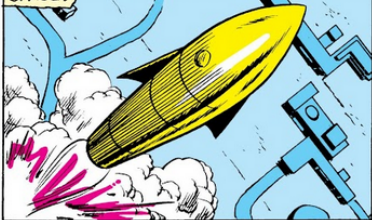
DON'T SAY IT,
REED! I'M YOUR
FIANCEE! WHERE
YOU GO, I GO!

AND I'M
TAGGIN' ALONG
WITH SIS--SO
IT'S SETTLED!



NO TIME TO WAIT FOR
OFFICIAL CLEARANCE!
CONDITIONS ARE
RIGHT TONIGHT!
LET'S GO!

BEFORE THE GUARD CAN STOP THEM, THE MIGHTY SHIP WHICH REED RICHARDS HAD SPENT YEARS CONSTRUCTING IS SOARING INTO THE HEAVENS...TOWARDS OUTER SPACE!

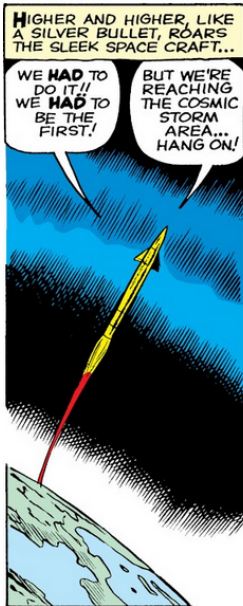


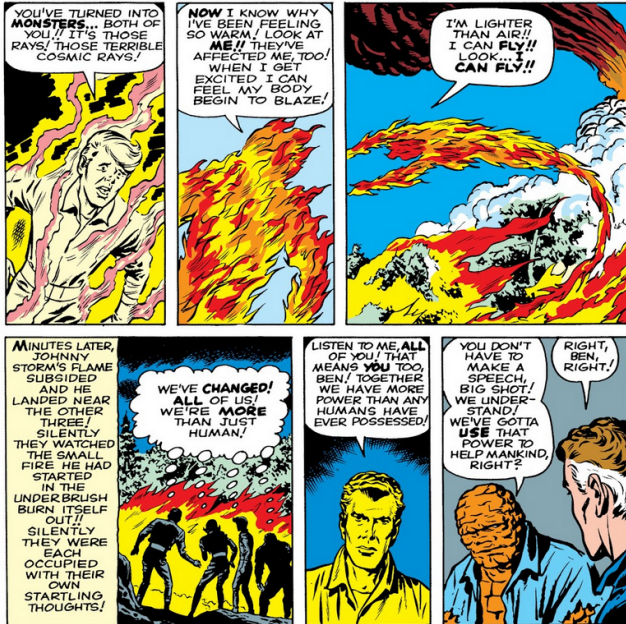
SHE'S BEHAVING LIKE A BABY! EVERYTHING
IS PERFECT!



YEAH, EXCEPT THE
COSMIC RAYS! NO ONE
KNOWS WHAT **THEY'LL DO...**

9

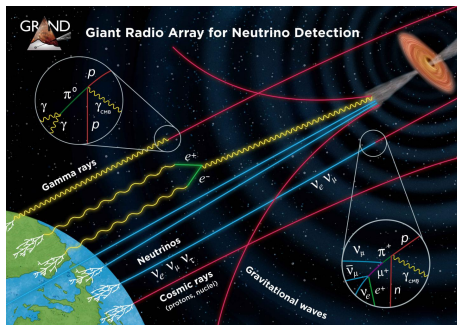




Tagline: Cosmic Rays are real!

Subatomic cosmic-ray 'neutrinos' can penetrate the fog!

- 60 billion/sec/cm²
- Key point of Zatsepin seminar: collisions of intergalactic protons with CMB results in production of neutrinos, as well!



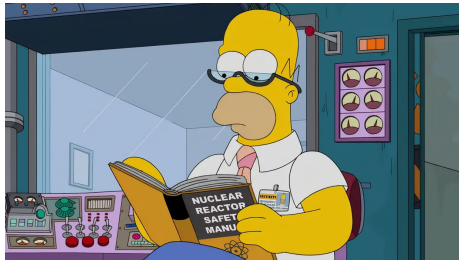
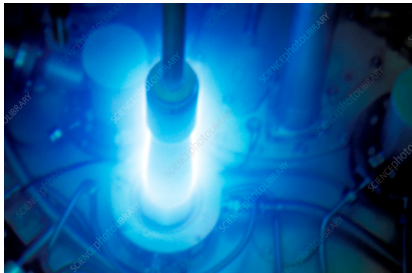
- But need a HUGE neutrino target! Must be uniform, dense, support deployment of sensors [Earth icecaps!](#)

South Pole / Summit Station, Greenland

Drill a hole; drop in the instrument and wait for a neutrino

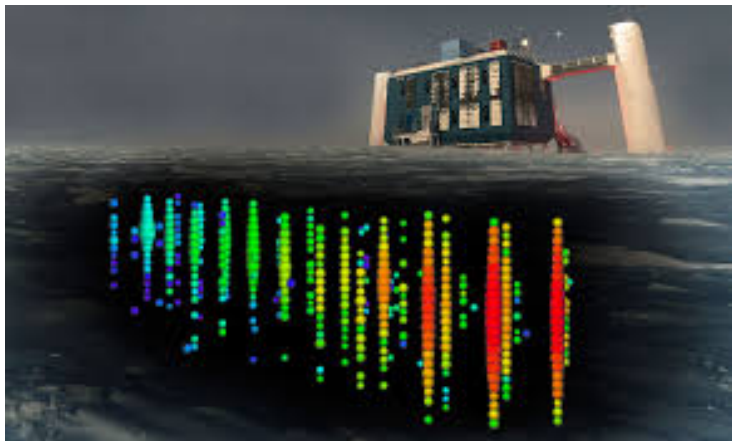


Detection of neutrinos: (Sergei) Vavilov-Cherenkov radiation



- Detect neutrinos by Cherenkov light produced when neutrino crashes into ice molecule!
- Same glow produced by electrons (from radioactive decay of fuel rods) in water of nuclear reactors
- (Aside: dzb occupied Cherenkov's office at INR, Moscow (Fulbright, 2006))

Neutrinos detected by glow produced by collisions with ice



III. Science v. Soviet dogma: Dialectical Materialism (DM)

- DM: Deterministic view - material conditions (NOT ideas!) drive historical and social change.
- Lysenko: seeds can be hardened through (heroic proletarian) struggle with harsh Russian environment and pass down acquired characteristics in genes (Lamarck).
- Counter to Darwin random favorable genetic mutations.
- ``Lysenko's first impression will leave you with the feeling of toothache'' (Pravda, 1925)



Lysenko: 'toughen' seeds via environmental stress

- 1921: graduates from HS of agriculture
- 1923: First publication: 'Techniques and methods of tomato selection at the Belotserkovskaya selection station'
- 1925: Second publication: 'Grafting of sugar beets.'
- 1926: Nikolai Vavilov sets Lysenko task of introducing legumes into Azerbaijan to address starvation of livestock
- 1927: 'I have discovered a method to fertilize fields without using fertilizers and turn the barren fields of the Transcaucasus green in winter' (sic)
- 1928: By chance, finds that moisturizing winter wheat seeds improves durability (actually known for a century)⇒Concludes Lamarck was right and Darwin wrong (although 'epigenetics'...)
- Official line: Lysenko increases millet yield 600%.

-Lysenkoism ported to China (contributed to 1959-61 Famine)

-1956: Tamm (CCCP bomb) learns of DNA and derides L. bunk

Nikolai Vavilov (Sergei's brother)

1926: Lysenko's original mentor/advocateur



Sergei Vavilov's brother, Nikolai, seen here as vice-president of the VI International Congress on Genetics in the US in 1932. He was tried and imprisoned for "sabotaging Soviet agriculture and spying for England" in 1940 and died in prison in 1943.

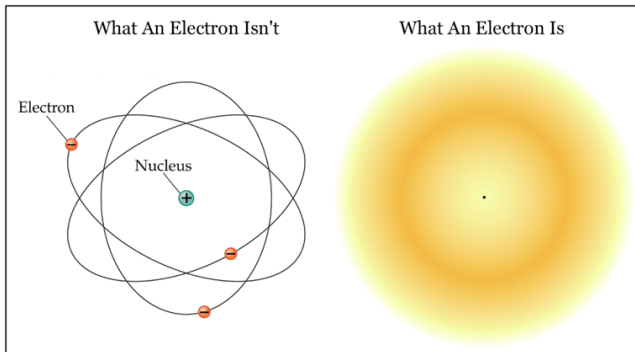
1942: dies after 3 years in prison after challenging Lysenko's data and statistical methods

B: Quantum ('Wave') Mechanics & Non-Determinism

- 'Wave-particle duality' (in your iPhone); Photon 'particle' vs. light 'wave'

Q: Where is the electron? Electron 'particle' at a definite point at a definite time; electron 'wave' not-so-much - best you can say is

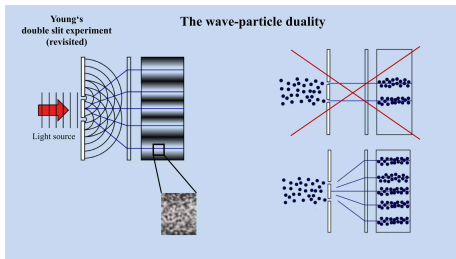
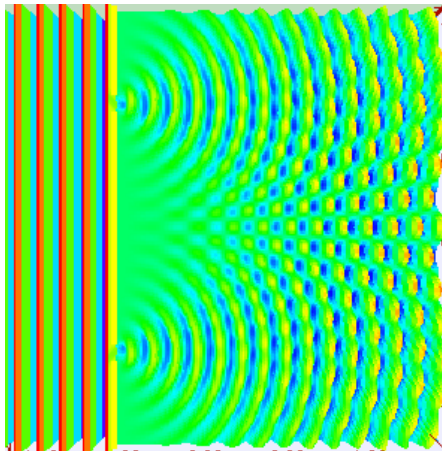
'electron has a probability of being at point x at time t '



Discriminate 'particle' v. 'wave' v. 'interference'

Determinism (DM): Electron pointed at one slit goes through that slit

QM: Single electron wave pointed at one slit can go through both simultaneously!



Randomness of QM vs. Dialectical Materialism

1. Within CCCP, general resistance to QM (and German/Jewish origins) through end of WWII
2. However, in 1949, a planned conference to condemn relativity and quantum mechanics canceled after Igor Kurchatov (head of Soviet nuclear bomb project) informs NKVD-head Lavrentiy Beria that can't build bomb without QM.
-Stalin unhappy about abandoning State-sanctioned dogma, but reportedly said, "We can always shoot them after we build the bomb"

Fast-forward: Recent consequences of Russian politics

- 1 Feb, 2022: EU & US suspend cooperation with Russian entities in research, science, and innovation.
- 2 August 2022: Russia announces intention to withdraw from International Space Station (ISS) after 2024.
- 3 November 2024: Formal termination of CERN's cooperative agreement with Russian Federation takes effect
- 4 February 2025: A new Russian law passed requiring Russian scientists to obtain approval from the Federal Security Service (FSB) for international collaborations

Currently, US & EU-based HEP collaborations disallow (generally) listing of Russian collaborating institutions.

Aside: Fortunately, US scientists are not (yet) judged on basis of national policies.

Isolation in Action (17Oct25)

Dear All,

As had been requested, 6 copies will be sent to Mohammad Sajjad Athar and 6 copies to Ilya Kravchenko.

As unfortunately I cannot send copies to Russia, I have requested 10 copies to be sent to Mohammad Ful Hossain Seikh and 13 copies to be sent to Dave Besson (as the address is the same I hope you can split them among yourselves and Victor Grachev).

I hope that all the free copies will reach you safely soon.

Best wishes and once again many thanks for publishing the special issue in EPJST,
Sabine

Von: Sabine Lehr <sabine.lehr@springer.com>

Gesendet: Freitag, 17. Oktober 2025 14:41

An: Грачев Виктор Михайлович <VMGrachev@mephi.ru>

Cc: EPJST (epjst@edpsciences.org) <epjst@edpsciences.org>; MOHAMMAD SAJJAD ATHAR <sajathar@gmail.com>; fulhossain@ku.edu; ikrav@unl.edu

Betreff: AW: EPJST: Radio Detection of Ultra-high Energy Neutrino and Cosmic Ray - new issue alert

Dear Professor Grachev,

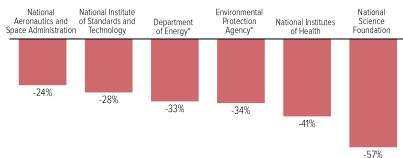
Thank you. I will send your copies to Dave Besson as requested.

IV. and in the US...

Cuts in staff and budget at NSF, NIH and CDC:

Trump Budget Would Severely Cut Wide Range of Non-Defense R&D

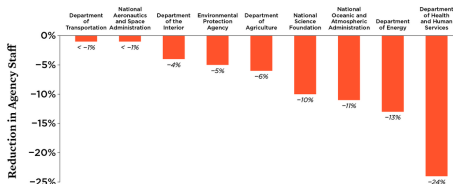
Percent cut in nominal R&D appropriations, 2026 versus 2025



Note: Agencies marked by an asterisk do not include whole agency budgets, only non-defense R&D-related spending categories.
Source: American Association for the Advancement of Science, 2025. CBPP calculations based on 2026 agency Budget Justifications

CENTER ON BUDGET AND POLICY PRIORITIES | CBPP.ORG

Staff Cuts in Science Agencies January through Mid-May, 2025



Politics Über Alles Case Study: Climate Change

1. No Orbital Climate Observatory data? No problem!



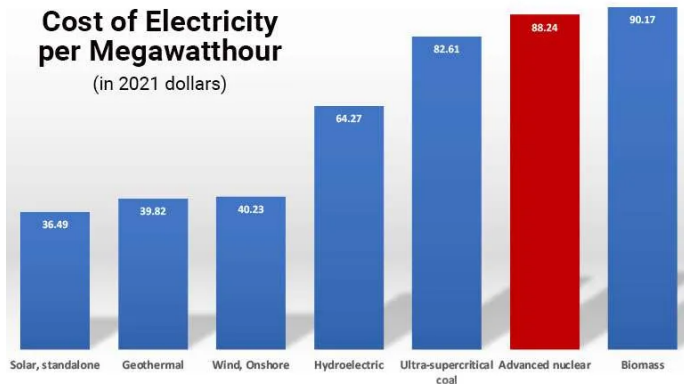
Making an Inconvenient Truth go away

The revenge of Cancel Culture:

- ➊ Greenhouse Gas Reporting Program (required emissions reporting by 8000 major industrial facilities) ended by the EPA.
- ➋ National Oceanic and Atmospheric Administration (NOAA) stopped updating website tracking U.S. weather and climate disasters (causing over \$1 billion in damages).
- ➌ Officials are in the process of decommissioning two NASA satellites that monitor global carbon dioxide levels (Steer the OCO to a fiery plunge into the atmosphere)
- ➍ also targeted long-running carbon dioxide measurements from the Mauna Loa laboratory in Hawaii.

⇒ “Climate Change” and “decarbonization” have gone the way of personal pronouns at KU.

The Economic Sense of a Carbon Economy

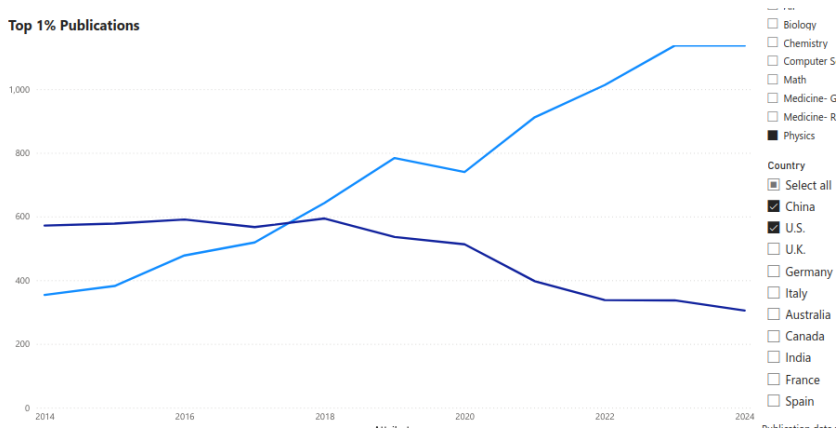


Source: Levelized Costs of New Generation Resources in the Annual Energy Outlook 2022, U.S. Energy

Meanwhile on the other side of the planet

China:US publications in physics=2.5:1

Top 1% Publications



Nature ranking of leading physical science institutions

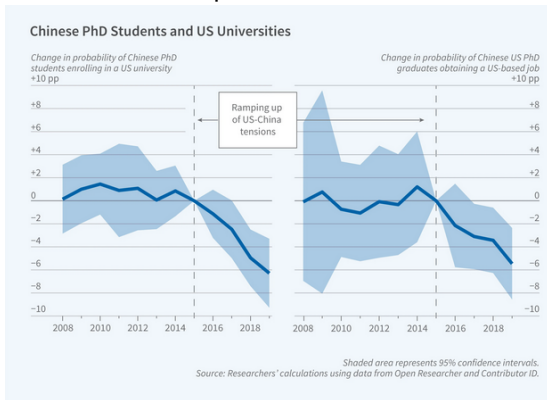
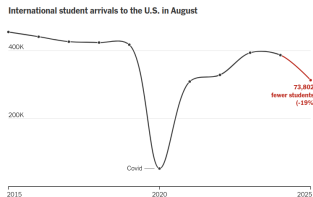
Position	Institution
1	Chinese Academy of Sciences (CAS)
2	Harvard University
3	University of Science and Technology of China (USTC)
4	Zhejiang University (ZJU)
5	Peking University (PKU)
6	University of Chinese Academy of Sciences (UCAS)
7	Tsinghua University
8	Shanghai Jiao Tong University (SJTU)
9	Nanjing University (NJU)
10	Max Planck Society
11	Fudan University
12	Sichuan University (SCU)
13	French National Centre for Scientific Research (CNRS)
14	Sun Yat-sen University (SYSU)
15	Stanford University



Recently commissioned Chinese solar farm: 1 Chicago-equivalent

Dropping foreign applicants to US graduate programs

Reminder: Approx. 1/2 of all US Nobel recipients were born outside US



Also, drop overhead rate from 54%→15%

ex Russia: Estimate 5000 science emigre's since beginning of Ukraine War
ex USA:

SO LONG, FAREWELL

Many of the 1,608 respondents who answered the question below in a *Nature* survey said that the election of Donald Trump as president had affected their future plans.

Are you a US researcher who is considering leaving the country following the disruptions to science prompted by the Trump administration?

Yes **75.3%**

No **24.7%**



©nature

Conclusions and Summary

The Good News:

- + (nationally) Unlike Russia, US does not have an autocratic president obsessed with political retribution setting science priorities, supported by the national legislature and judiciary
- + (locally) KS not among (blue) losing \$30 B of federal grants
- + (very locally) POTUS announced 'special' schools can become eligible to funds if they agree to certain 'rules'. Originally invited MIT, Brown, USC, Penn, UVa, (rejected); UT, Austin, Dartmouth, Arizona, Vanderbilt (not-yet-decided); added ASU, Wash U. and KU (safety schools).

Bad News: Consequences for civil society considerably more acute than for academy.

University of Kansas chancellor joins White House talks on Trump's higher education deal

Girod described 'productive' dialogue on strategy to reshape colleges, universities

BY TIM CARPENTER - OCTOBER 20, 2025 3:06 PM



Post-script

So as not to end the talk on a downer:

