

Physics Career and Life:

A Perspective



Background

- Graduate School Years will be/have been the Simplest of your Academic Life
- Postdoctoral Years are hard
 - Must leave “home”
 - In many/most cases, establish life in a new country (at least, for around 5 years)
 - Real experience of diversity = Critical for true academic development
 - Places (huge) stress on life-partners/families
 - At postdoctoral level, hiring institutions are unlikely to make concessions that involve supporting career of a life-partner
 - Must define yourself as an independent researcher
 - Simultaneously
 - maintain connections with existing sponsors
 - expand network of collaborators and sponsors
 - Learn new skills and how to work/cope with different people, expectations, environments





Postdoc/Job Market - USA - Hadron Physics

- Huge cuts across the board since January 2025
 - Example: 2026 ... Argonne National Laboratory sees 22% cut compared with 2024
- Huge increase in political interference in science funding and direction decisions
- Anecdotal = budgets slashed by 50-60% in some divisions/departments at national laboratories/ universities
 - Staff cuts
 - Remaining funds used to retain existing staff
 - Workforce redistributions
 - Fewer new hires & fewer new postdocs

Trump fires entire NSF advisory board

On Friday, all 22 members of the board that advises and oversees the US National Science Foundation (NSF) – a leading funder of basic science – were [fired by the administration of US President Donald Trump, without explanation](#). The National Science Board was founded by Congress in 1950 and can officially be dissolved only by Congress. The Trump team did not respond to *Nature* about the reason for the firings or whether the board members would be replaced. The move fits into a pattern of the Trump administration's approach to science advice, which is being "systematically either dissolved or eviscerated", says astrophysicist Keivan Stassun.

[Nature | 7 min read](#)

- Too early for statistically meaningful analysis of impacts of these recent events

Postdoc/Job Market - USA - Hadron Physics

- Information is available for 10 years
- 10 years ago, the field was dominated by JLab 12 GeV upgrade and RHIC.
- Today ...
 - JLab/RHIC legacy positions are fewer — analysis of JLab, RHIC data is much lower priority
 - Any new ONP growth is EIC tagged

Postdoc/Job Market - USA - Hadron Physics

➤ Theory:

- 2023 Long Range Plan created an EIC Theory Alliance — dedicated bridge postdocs, postdoctoral fellowships, and 2 fellowships (one based in US - BNL or JLab) for EIC-FCC collaboration in planning.
- Theory fellowships doing “theoretical calculations related to hadron structure (PDFs, TMDs, GPDs, etc.)” at JLab are now standard
- Hadron structure/EIC/lattice QCD/TMD/GPD phenomenology
 - number of advertised US postdocs in 2024-2026 is roughly flat because of dedicated EIC funding.
- Traditional hadron spectroscopy / meson-baryon scattering / non-EIC phenomenology, the number is down



Postdoc/Job Market - USA - Hadron Physics

- 10 years ago, you might have seen ~15-25 pure hadron physics postdocs per year on INSPIRE/Academic Jobs Online in the USA.
- Now it's ~12-20, but 60-70% of them have “EIC” in the description.
- Graduates/year with PhD in hadron physics
 - USA: 50 – 70 people
 - Outside USA: 100 – 150 people
 - So, worldwide ... 150 – 200 people each year graduate with PhD in hadron physics
- Historically, graduates have looked to the USA as the “prime market for experience and opportunity”
 - Can’t do that anymore because, plainly, in USA, job market is *tight* and *opportunities* are *disappearing*

Academic Career in USA

- *Canada has poached 48 US-based senior academics to join its top universities, in a sign of an exodus from elite higher education institutions that have come under attack by Trump's administration.*
- I don't know where this is going
 - It appears to me that the USA is going down a lot further before it might begin to recover
- Short term prognosis = bad
 - Especially for foreign born scholars with foreign-born life-partners
 - Difficulties even for US citizens with foreign-born life-partners
- I am advising INP graduates (NJU, China) to avoid the USA

Education + Add to myFT

Canada poaches 48 top US-based academics

Trump administration's assault on universities boosts Ottawa's efforts to attract top research talent



Researchers heading for Canada include MIT astronomer Sara Seager © David Buchan/Variety/Penske Media/Getty Images

Andrew Jack in London and Ilya Gridneff in Toronto

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Postdoc/Job Market - Europe - Hadron Physics

HADRON-2030 - Access to physics with hadrons at the frontier of knowledge: fundamental research and applications

- In Europe it's the opposite of the USA
 - more positions now than 10 years ago.

- NuPECC 2024 Long Range Plan survey:

- More than 5300 scientists work in nuclear physics
 - Approximately 4100 in experiment and 1200 in theory
 - Approximately 1800 PhD students & 1000 postdocs
 - Over 2500 scientists with permanent positions.
- Increase of $\approx 30\%$ in 6 years

- Reasons

- Continuing EU Funding structures specifically designed for hadron physics
 - STRONG-2020
 - “about 2500 researchers in Europe” working on 3D proton structure, hadron spectroscopy, exotic states, quark-gluon plasma.
- Now Hadron-2030



Funded by the
European Union

Postdoc/Job Market - Europe - Hadron Physics

➤ Reasons

- Two flagship facilities creating dedicated postdoc lines that didn't exist 10 years ago:
 - FAIR/PANDA at GSI/Darmstadt
 - EIC (US facility, European participation)
- CERN fixed-target + LHCb / ALICE hadron program
 - AMBER, COMPASS++, LHCb exotic hadron spectroscopy grew significantly after 2015

➤ Funding

- Hadron-dedicated EU money has roughly doubled in the past 10 years
- € 10-million → € 20-million

➤ Counting only English-language advertised postdocs on INSPIRE/Euraxess labeled “hadron/QCD/EIC/PANDA/lattice”:

- 2015: ~25-35 open at any time in Europe
- 2025: ~45-60 open at any time

Postdoc/Job Market - Europe - Hadron Physics

➤ Strengths

- More openings than USA
- Broader range of opportunities (less concentration on ONE facility/programme)

➤ Issues

- Language is a barrier between postdoc and permanent position
- “Diversity” means equal number of white women and white men ... other ethnicities are invisible

➤ On Balance

- Europe provides a larger range of better opportunities
- Especially if a person is looking for “international experience” before returning to a “home base”
- Notwithstanding, “local/inside knowledge” is important to winning positions



Institution rankings

Time frame: 1 May 2025 - 30 April 2026

Region or country/territoryGlobal

SectorAcademic

Subject or journal group— Physical sciences

- World’s Top-5 Universities in Physical Sciences
 - 4 are in China
- World’s Top-20 Universities in Physical Sciences
 - 8 are in China

Position	Institution	Count	Share
1	University of Science and Technology of China (USTC)	829	205.68
2	University of Chinese Academy of Sciences (UCAS)	856	159.19
3	Peking University (PKU)	682	137.63
4	The University of Tokyo (UTokyo)	474	130.25
5	Nanjing University (NJU)	415	114.33
6	Massachusetts Institute of Technology (MIT)	657	114.13
7	Tsinghua University	515	107.29
8	Harvard University	571	107.20
9	Princeton University	450	89.11
10	University of California, Berkeley (UC Berkeley)	539	83.94
11	California Institute of Technology (Caltech)	509	81.74
12	Swiss Federal Institute of Technology Zurich (ETH Zurich)	259	81.30
13	The University of Chicago (UChicago)	436	75.85
14	Stanford University	431	75.14
15	Kyoto University	251	74.31
16	Shanghai Jiao Tong University (SJTU)	308	72.65
17	Fudan University	328	71.75
18	Sun Yat-sen University (SYSU)	288	71.51
19	University of Oxford	379	71.00
20	University of Cambridge	305	69.98

Postdoc/Job Market - China - Hadron Physics

- Huge expansion in number of postdoctoral opportunities in China.
- Ranking for growth 2015 → 2025:
 - China: 3-times increase
 - Europe: 1.5-times increase
 - USA: decreased by one-half
- Examples
 - NJU INP is now Hub for International Collaborative Creative Research Team (ICCRT)
 - New NSFC investment in hadron physics theory ¥6 000 000 over three years – purchasing-power equivalent $\approx$ \$6,000,000
 - NJU INP ICCRT
 - soon advertise 6 new postdoctoral positions in hadron physics theory and 20 student positions
 - China's top-ranked universities have strong and growing hadron physics programmes in experiment and theory

Postdoc/Job Market - China - Hadron Physics

- Efforts underway to operate and promote new facilities
 - BEPCII operating
 - HIAF operating
 - Super Tau Charm Factor – promoting
 - Electron ion collider in China – promoting
 - Circular electron positron collider – promoting
- Postdoctoral salaries in China
 - Now competitive with and can exceed those in Europe
 - Cost of living in China is (much) lower

Postdoc/Job Market - China - Hadron Physics

➤ Talent programmes available

- Available to early-career scientists (different programme for senior scientists)
- Open to non-Chinese nationals
- To win, must have strong record of international achievement
 - Highly competitive
 - Highly rewarding
 - Instant tenure
 - Excellent salary and benefits package
 - Possibility of life-partner consideration (negotiation necessary and possible)

➤ Issue

- Talent programmes are across all field
- “Bias” toward materials science and applied fields
- Stupidity in ranking impact factor of journal ahead of impact factor of publication

Craig Roberts: cdroberts@nju.edu.cn 483 .. 26/09/07 ... "Physics Career and Life: A Perspective"



Postdoc/Job Market - China - Hadron Physics

- Not speaking/reading Chinese is no impediment to working in China
 - Smart phone apps work for translation
 - Chinese colleagues are very helpful
 - Chinese person in the street is very helpful ... it only takes a smile
- Distance is no impediment to working in China
 - Even with airlines that cannot now fly over Russia, it's only 12 hours to an air hub in Europe or the USA
 - (I lived in the USA for 30 years ... it took 30 hours to reach my home-town in Australia)

Postdoc/Job Market - China - Hadron Physics

- The only impediment to working in China is *ignorance and prejudice* fostered by biased Western media and self-serving politicians
 - No person who has never visited China is qualified to speak about China's strengths and weaknesses.
 - Typically, this is just a Western (White) Supremacy Perspective speaking
 - I find it deeply embarrassing
- Culture and society in China are different to Western culture
- Political system is different
- I've lived in China for 7 years
 - I know these things
 - They are not threatening
- Moreover, for a postdoctoral appointment, these things are an additional benefit
- And for long-term career development, no country is today investing more than China



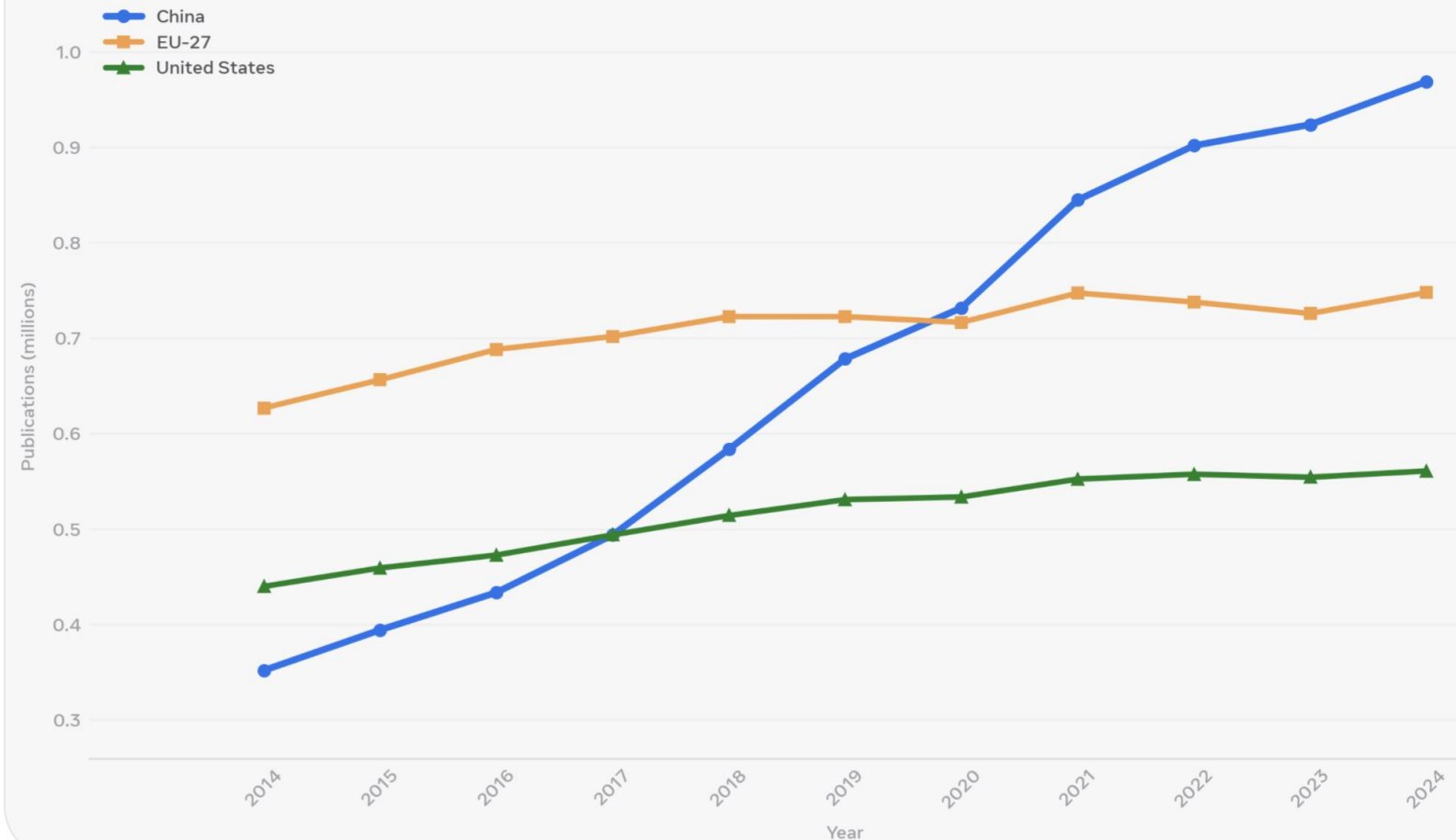
Postdoc/Job Market - China - Hadron Physics

- China is not perfect
 - ... none of us are
- But I've been watching China develop, on the ground – with long term collaborations, for more than 20 years
 - ... the pace of progress is amazing
 - ... it is not slowing down
- Like life in Europe or life in the USA (my German wife will never again live in the USA),
 - ... life in China is not for everyone
 - ... but, at least for a few years as a postdoc, it's an opportunity/possibility that should not be overlooked

Publication Share

- EU-27 led in 2014-2018, then flat around 0.7M
- US flat around 0.45-0.56M
- China from ~0.35M in 2014 to ~0.97M in 2024, crossing both EU and USA around 2019-2020
- China is now publishing $\approx$ 1.5-times the number of papers as Europe
- Population ratio $\approx$ 3: 1
- Publications/head of population in China will pass Europe in around 10 years

Scientific Publication Output (S&E articles) 2014-2024
China vs EU-27 vs United States



- 1970: GDP Europe = 8-times GDP China
- 2020: GDP Europe < GDP China
- The Future is Coming

CARPE
DIEM



Basic Facts

- Eastern $\frac{1}{3}$ of China is wealthy
 - *e.g.* Jiangsu Province
 - Land area 20% of Spain or 33% of Germany
 - 80-million people (similar to Germany)
 - Economy on the order of New York State or Texas or Italy or Spain
- Poorer parts in centre and west of China
 - Central government levies taxes on richer provinces to promote growth in poorer parts
- Chinese cities are modern
 - Many nevertheless possess numerous areas of historic interest
 - *E.g.* Nanjing (9.3 million people)
 - Ming Dynasty Capital (1368–1421) ... 1st time all China ruled from one city
 - Nanjing City Wall – Ming Dynasty
 - » Originally 35.267 kms; 25.09 kms remain today
 - » Most ancient city wall still standing in the world today

Current Academic Status

- International political climate means many talented, western-trained physicists (experiment and theory) are returning to top-rank Chinese universities with “1000 Youth Talents” status
- Such returnees have excellent funding
 - Looking to hire students and postdocs
 - With such people, academic autonomy matches that of any Western appointment
 - Contracts are typically 2-years with extension for 1 year possible
 - Salaries competitive with those in Europe and many sites in USA
 - Cost of living in China $\approx \frac{1}{2}$ cost in USA
 - Postdocs can (are encouraged to) compete for Provincial and National grants
- Longer term career depends on performance – as everywhere else
 - 1000 Youth Talents plan is open to foreign nationals
 - Extremely competitive
- New Facilities being promoted = EicC, Super tau-charm, CEPC



Living in China

➤ Barrier = Language 说中文

– Solutions

- Most/many street signs carry Pinyin expressions = Chinese written in Latin script
- Smartphone translation apps are good and getting better
- Chinese people are friendly, patient, welcoming – when shopping/travelling, almost certainly encounter a smile instead of a frown when request assistance

➤ Barrier = Banking system and payments

– Solutions

- Working Contract enables entry to banking system
- Everything paid using smart phone = WeChat or Alipay (cash rare, credit cards rarer)
- Access to these apps can be shared with spouse
- Working visa for spouse is possible, if spouse has a sponsor (similar to USA)

Living in China

➤ Health Services

- Very good
- Modern
- Inexpensive (small amount deducted from salary ... additional insurance is not really necessary)
- Need Chinese-speaking friend/colleague to assist with language

➤ Western favourites

- All (almost?) familiar western goods can easily be bought online
- Coffee, wine, cheese, beer, fruit, meat, etc.
- Tea ... China is the home of tea ... and it can cost real money

➤ Accommodation

- Comparable apartment is less expensive than in West
- City centre living is affordable



Living in China

- Non-Chinese driving license is invalid in China ... obtaining Chinese driving license is easy for anyone who can speak English = computer-operated multiple-choice test.
 - Car is typically unnecessary – Chinese cities have excellent public transport networks
- Purchase of electric moped = easy and inexpensive & no driving license is necessary
 - Use to travel to train/metro station and for simple shopping
- Taxi fares are $\frac{1}{4}$ those in the USA
 - ✓ Saturday night \$15 for 30km ride from city centre to suburban Nanjing
 - ✓ Similar in Shanghai
- Chinese cities are exciting and SAFE
 - Cafés, bars, restaurants, music
 - Coffee shops are ubiquitous
- Different cities offer different choices
 - Shanghai $\approx$ 30-million people has everything

Life and Science in China

- The best thing any person can do is come to China and see for themselves
- Opportunities + Challenges
 - + Genuinely Exciting & Well-Funded Basic Science Environment
 - NSFC funds 25% of applications ($2 \times$ US DOE funding request success rate)
 - Proposals can be submitted in English!
- I am kicking myself for not relocating sooner
- Might be worth giving yourself a chance of avoiding that mistake