Turning your Nuclear Physics Degree into a Career

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Physicists are highly employable because we are good at building models.

Assumptions for physics faculty:
- Typical career duration: 30 years
- Number of students advised: 10
- Growth rate of positions: $\approx 1.3\%$/year
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$$N_{\text{faculty}}(t) = N_0 e^{t/\tau}$$

$$N_{\text{openings}}(t) = \frac{N_0}{\tau} \left[ e^{(t-30)/\tau} + e^{t/\tau} \right]$$

$$N_{\text{applicants}}(t) = N_0 \frac{10}{30} e^{t/\tau}$$
There are not nearly enough faculty openings and it's getting worse.
Advice that everyone needs to hear:

- There are not enough faculty jobs for people who want them.
- There are abundant postdoc opportunities, but taking a postdoc may not be right for everyone.
- Most PhDs leave academia and are happily employed.
Take my advice with a grain of salt.

- My experience is limited to the United States.

- I have experience as an applicant, not as a member of a search committee.

- I’m just one person. No individual situation is typical.
My academic trajectory

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- Tenure-track at GW
  2020–
Academic physics is a ponzi scheme.

1500 new physics PhDs / year, faculty turnover is < 300/year
https://www.aip.org/statistics
If you want to be a professor someday...

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  - about where you live, or the kind of institution
If you want to be a professor someday...

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- You may have to make compromises.
  - about where you live, or the kind of institution
- It may take a long time.
  - How would you feel about a 9-year postdoc?
Faculty Applications

Everyone asks for:

- Cover letter
- ≈ 3 letters of recommendation
- CV
- Research statement
- Teaching statement
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You might additionally be asked for:

- Service statement
- Diversity statement
- Proposal for a new course
A faculty application is a great opportunity to lay out your “five-year plan.”

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My track record

2016–2017: 3 applications
   - 3 direct rejections

2017–2018: 11 applications
   - 10 direct rejections
   - 1 shortlist → rejection

2018–2019: 5 applications
   - 3 direct rejections
   - 2 shortlists → offers

Make your postdoc count!

High-impact results
Rapid timeline
Publications in major journals

Fun, exciting, but highly speculative research is a poor strategy.
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After you become a faculty member:
Where does the money come from?

A university will pay you 9 months out of the year.

- i.e., if your “12-month salary” is k$120, they will pay k$90.
- Your responsibility is to teach, serve the university from September through May.
After you become a faculty member: Where does the money come from?

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All research must be funded by grants.
- US federal grants will pay up to two months of summer salary.
- Salaries for postdocs, stipends and tuition for students, travel, equipment
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Universities provide a “start-up” fund for new faculty to give them time to secure grants.
Advice that everyone needs to hear:

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- **There are abundant postdoc opportunities**, but taking a postdoc may not be right for everyone.

- Most PhDs leave academia and are happily employed.
Postdocs are in demand because they produce significantly more research per dollar.
Landing your dream postdoc: exploit personal connections.

- Applying to job postings is not the most effective strategy.

- Use SOCIAL SKILLS
  - Socialize at conferences!
  - Have your mentors, their friends be your marketing agents!
  - Write to people whom you’d like to work for!

- People hire based on word of mouth.
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Think strategically about your academic career.

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During your postdoc time:

- Prioritize high-impact, short-time line results.
- Apply early, apply often.
- Know how long you’d be willing to stay a postdoc.
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Where people go after their PhD

Initial Outcomes

Industry
Postdoc
Academics
Government
Other
Temporary
Temporary
Unemployed

Includes only degree recipients who remained in the US.
Starting salaries

Starting Salaries for New Physics PhDs, Classes of 2015 & 2016 Combined

- Potentially Permanent Positions
  - Private Sector
- Postdocs
  - Government Lab
  - University & UARI
- Other Temporary Positions
  - University & 4-Year College
My closest friends in grad school are now

- a data scientist at a private research lab
- an engineer at a DoD research and development center
- an analyst at a small consulting firm
- a researcher at a different DoD research and development center
- a software developer at a healthcare company
- a proton-therapy medical physicist
- a machine-learning engineer for a business software company
Where to start?

www.aps.org/careers

- Job board
- Advice on how to apply
- Webinars, resources
Advice

- Work on your web presence
  - Get a LinkedIn profile and *post*
  - Update your github profile and showcase your coolest projects
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- Decide where to aim
  - Only you know what kind of work makes you happy
  - Research your options
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■ Decide where to aim
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■ Talk to people
  ■ Build your network
  ■ Ask questions, *learn!*
Skills to think about now

What I hear industry people say about physicists

- They are bad at finishing projects on a timeline.
- They lack management skills.
- They don’t know how to write code that other people will use.
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What I hear industry people say about physicists

- They are bad at finishing projects on a timeline.
- They lack management skills.
- They don’t know how to write code that other people will use.
- No matter the problem, they’ll find a way to attack it.
To recap:

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- Take a postdoc for the right reasons
To recap:

- Not enough faculty jobs
- Take a postdoc for the right reasons
- Physicists succeed in industry
Physicists are extremely employable.

Even in a bad labor market, people want to hire physicists.

Your skills are in serious demand right now.