How to Stay in HEP, or How to Get What You Came For When You Came to Fermilab

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- **Who Am I and Why am I Here?**
- **Statistics on Recent Faculty Hires**
- **What You Can Do to Improve Your Chances**

Who Am I?

B.A. in Physics from Carleton College in 1986.

Studied particle theory for a year at Cambridge University.

Entered University of Chicago in '87 with notions of being a theorist; eventually disabused of this and joined CDF in 1990. Wrote my thesis on a search for $W\prime \to l\nu$ and graduated in 1992.

Took a postdoc with the CDF group at the University of Michigan. Worked on top search/discovery using secondary vertex b-tag and co-led this analysis subgroup during Run Ib.

Also at Michigan, I designed and built an upgrade to our shower max electronics that allowed us to lower the trigger threshold for inclusive electrons (got about 1M more $b \to eX$ events).

SSC cancelled in 1993... I started applying for faculty jobs in fall '94. Only tried for research universities on this iteration. Applied for 7 jobs, got 3 interviews, 1 offer.

Have been an assistant professor at Johns Hopkins since Jan. '96. Working on (what else) CDF.

Why Am I Giving This Talk?

Have noticed that GSA sponsors a lot of activities (computer classes, speakers from industry…) aimed at helping people leave physics. **This is great!** Many people need/want to leave the field, and these activities are extremely valuable.

But many of you are presumably interested in staying!

☞ You should be getting more advice on how to do it.

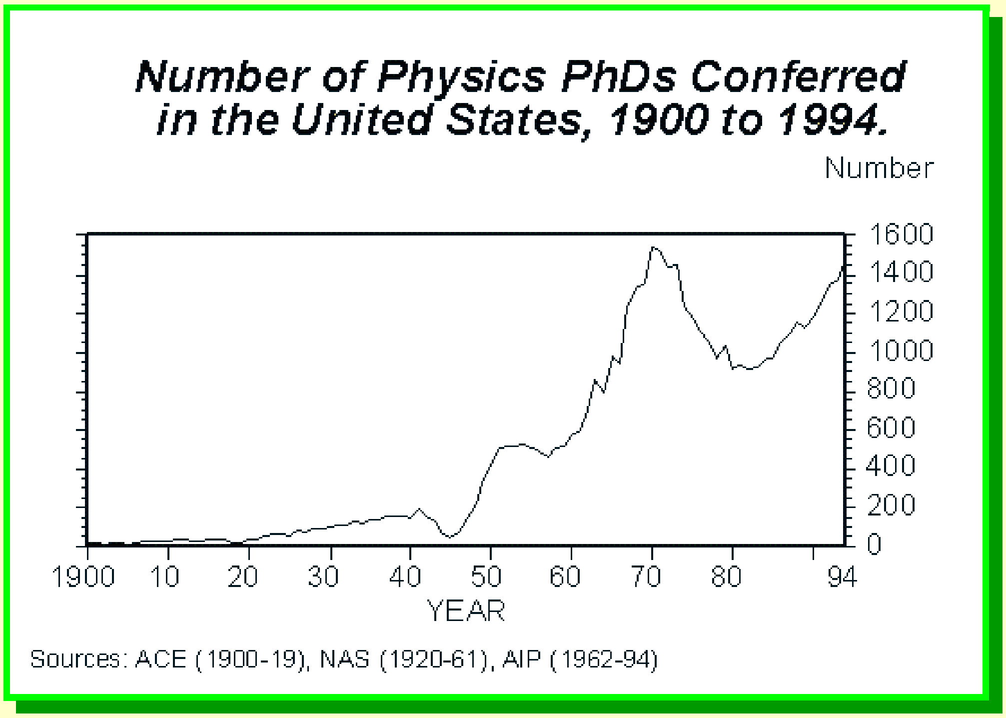
Concerned about comments/morale reflected in recent HEPAP subpanel community forum and GSA survey responses.

Sat on a HEP faculty search committee last year, so I now have some insights into how the sausage is made.

This talk will focus on faculty jobs at research universities, but much of it applies to jobs at national labs as well.

There **ARE** *Jobs Out There. . .*

. . . But the number of Ph.D.'s has been increasing in the past 15 years.



Note that this includes all fields of physics.

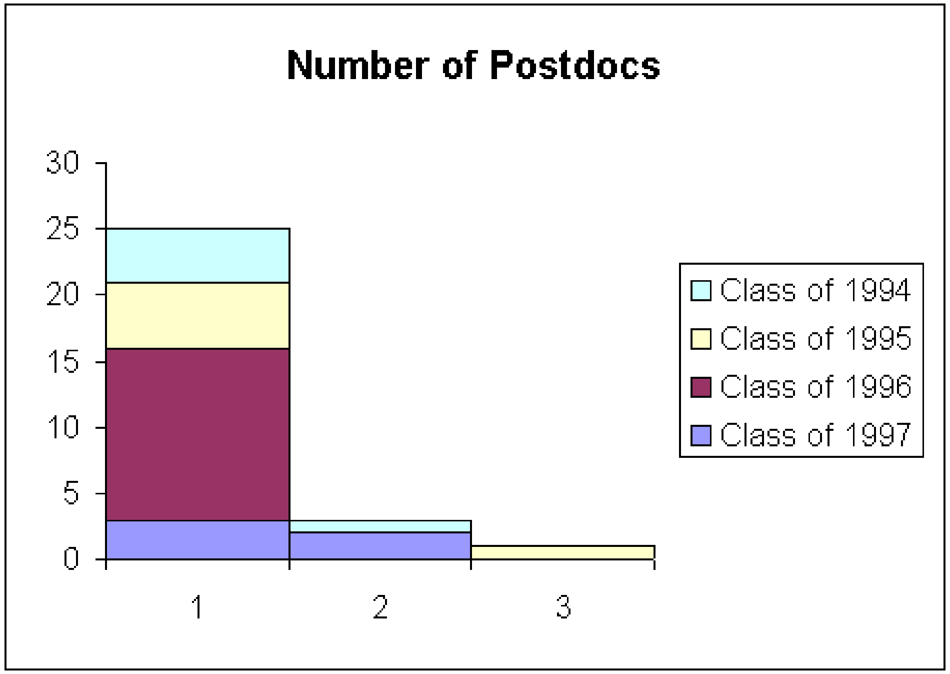
☞ The situation is further complicated by the fact that people are staying in postdocs longer.

In recent years, there have been about 6-10 tenure-track positions in HEP experiment filled per year at U.S. research universities. Presumably, the number of comparable positions at national labs is about the same.

Who Succeeds?

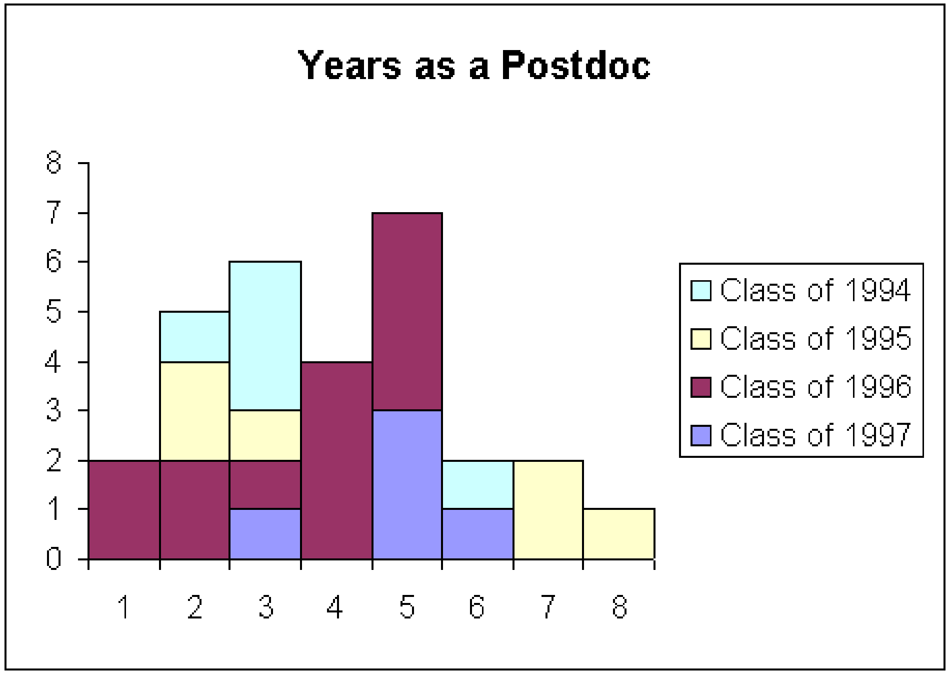
The "Experimental Particle Physics Jobs Rumor Mill" (`www-hep.colorado.edu/~bbehrens/rumor.html`) has collected statistics on faculty hires in the last 4 years. The results are quite revealing...

Very few people had more than one postdoc:



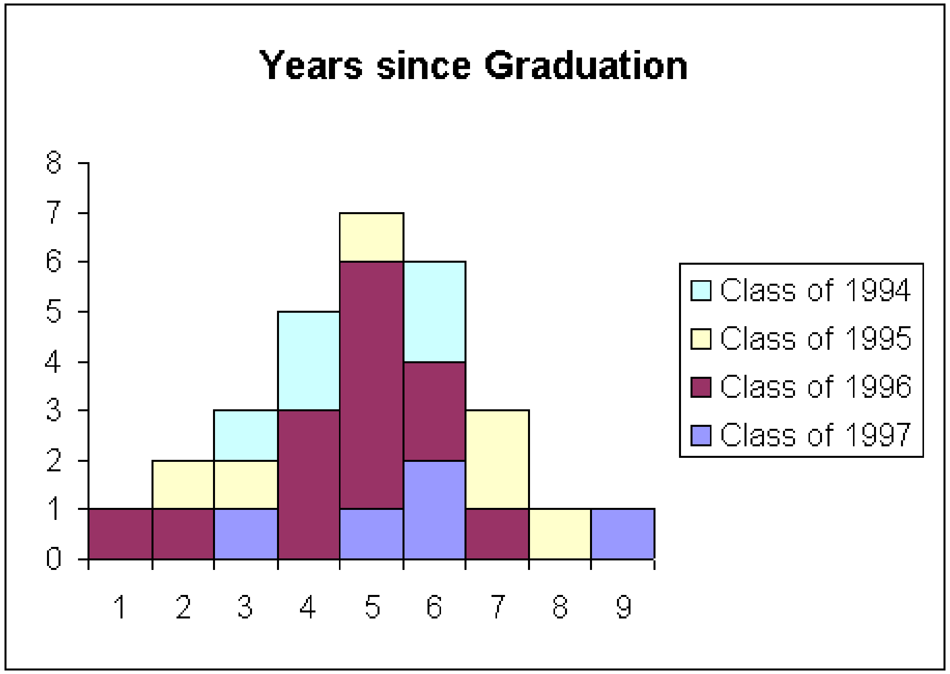
Who Succeeds? (cont'd.)

Most spent between 3 and 5 years as a postdoc:



Who Succeeds? (cont'd.)

Most got their job within 6 years of getting their Ph.D.:



Moral: After 1 postdoc or 6 years, the odds get considerably longer. You need to make the most of your first postdoc.

What Can You Do to Improve Your Chances?

Experimental HEP requires skills in three areas:

1. **Physics Analysis.** Significant, original contributions to important analyses.
2. **Experiment-building.** Includes hardware and/or software skills.
3. **Leadership.** Often required for success in the first two areas.

I believe that one's long-term survival in HEP requires competence in all three of these areas and excellence in at least two of them.

Choosing Your Analysis

As a graduate student, you may not have much choice (it's what your advisor's interested in...) But your actual thesis topic doesn't matter much. It's more important to do a good job and show evidence of promise.

As a postdoc, you must choose with more care:

- Not enough to "follow orders." Originality counts.
- Some analyses get more exposure than others.
- Reflects on your taste in physics.
- Whatever you do, become a world expert on it.

Don't discount the importance of timing and luck...

Consider whether people will be interested in hearing about this analysis at conferences and job talks.

Choosing Your Hardware Project

If you have choices as a postdoc, here are some things to consider:

- **Timescale:** Does it have a finite duration or does it involve an open-ended committment? How soon will it pay off with physics results?
- **Importance:** How critical is it to the experiment? It is *good* to place yourself squarely in the critical path. (No risk, no return...)
- **Your role:** Can you be in charge of something significant?

You can try to negotiate these things before you accept a postdoc offer...

In general, it's best to make an important hardware contribution early on, then reserve the end of your postdoc for analysis.

Applying for a Faculty Job

What are search committees looking for?

- Scientific maturity and depth. You will need to guide a research program, advise students, etc.
- **Exceptional letters.** Most important thing!
- Interest in and knowledge of broad areas of physics outside the area you've worked in. The field will change a lot over 30 years...
- Will you make a good colleague?
- Fitting in vs. standing out...
- Will you bring in grant money?
- Can you teach?

If you know somebody at the university in question, talk to them before applying to get some "deep background." (Amazing how many people don't do this!)

Choosing Your Letter-Writers

Letters of recommendation are the most important part of your application. Choose your writers with great care!

- ☞ Not all from your home university.
- ☞ Spokespeople good, but beware the tepid letter.
- ☞ Letters from well-known tenured faculty are best.
- ☞ Lab staff seem to write weaker letters.
- ☞ One bad letter (or comment) is a killer.
- ☞ Be sure they know what you've done!
- ☞ See who wrote letters for past successful candidates.

So You Got an Interview...

Remember that you are on your own, and the competition is tough.

- Prepare a clear, insightful talk and *practice* it in front of people who can give you constructive feedback. The talk needs to be well above the quality of the usual CDF/D0 analysis group talk, and should make clear what your own contributions were.
- You'll meet a lot of people, some from outside HEP. Make sure they all know what *you* did. (Outsiders are puzzled by the sociology of this field and will assume you are a drone till proved otherwise.)
- Bring relevant materials with you so you can produce that key plot, for example, if needed.
- Find out who you'll be talking to; know what they are working on; see what they are publishing.

Questions to be prepared for

1. How will you get funded?
2. What will you need to get started?
3. What will you work on if you come here?
4. What do you think the interesting problems will be in ten years?

What You Will Miss if You Don't Get a Faculty Job

- Line of surly premeds outside your door.
- Nearly 6-figure salary. (5 is nearly 6...)
- Regular helpings of airline cuisine.
- Playing a key role on the parking lot committee.
- "Do we need to know that for the exam?"
- Faculty wars (cf. Bosnia, Middle East)
- Tenure reviews.
- Competition for scarce funding resources and a diminishing graduate student pool.
- Lengthening timescales for experiments.

☞**The only reason to keep going in this field is because you have a real love of physics and a burning desire to know how the world works.**

Either way... GOOD LUCK!