CAREERS

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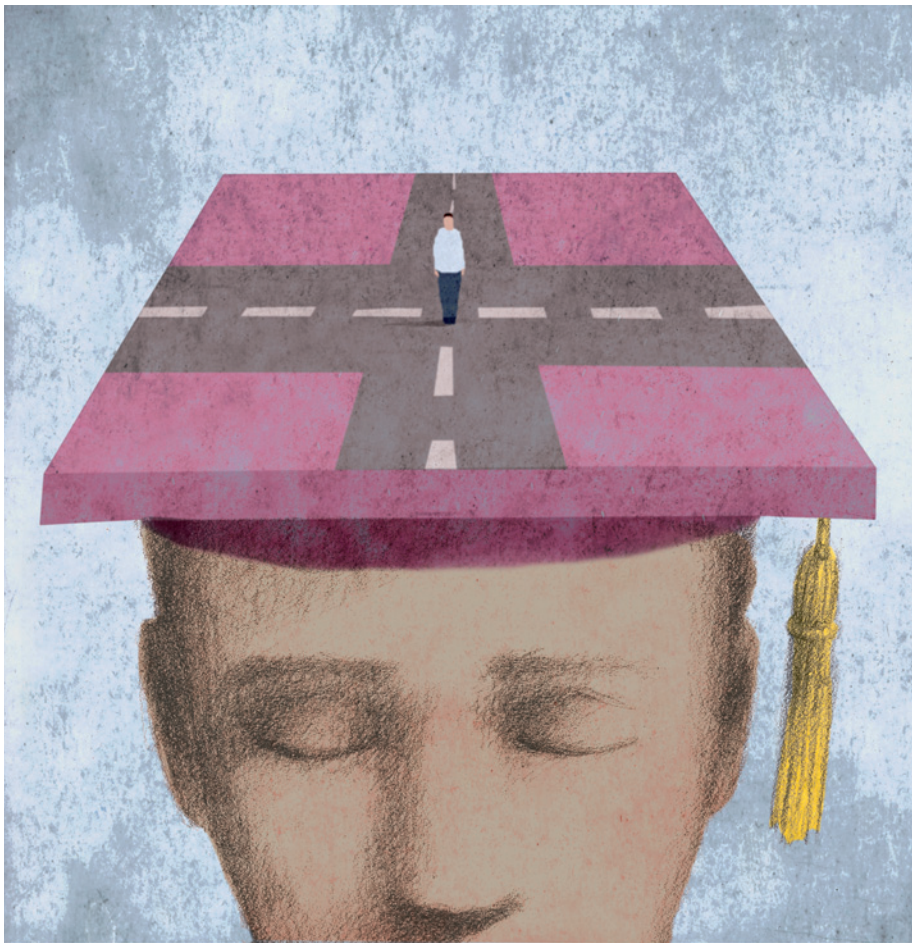

RESEARCH

Postdoc or not?

Life-sciences graduates interested in academic research typically need to do at least one postdoc. For physics students, there are multiple caveats to consider.

BY KAREN KAPLAN

Björn Flatt had always assumed that he would become an academic physicist. After earning his PhD in particle physics from Johannes Gutenberg University Mainz in Germersheim, Germany, he was happy to land a postdoctoral fellowship at Stanford University in Palo Alto, California.

But things deteriorated rapidly. The two-year fellowship was extended by a further two years so that Flatt could complete time-intensive experiments, but the delay hampered his efforts to break into the permanent-job market. By the time he started looking for an academic position in 2009, the effect of the recession was already widespread. He received no interview offers.

Flatt came to realize that he did not want to pursue an academic career after all, and set his sights on industry. However, he could not find a permanent research post, and ended up starting another postdoc, this time in mass spectrometry and instrumentation physics at Agilent Technologies in Santa Clara, California, which was at least a way to get his foot in the door. "It wasn't exactly my field, but my theses had been on instrumentation development," Flatt says. "It was actually a pretty good match." Last March, several months before the postdoc was due to end, Flatt heard about an opening in the company for a senior research and development scientist, a permanent position. Flatt applied for it and got the job.

Today, after a year in his new post, Flatt says that his two postdocs offered little value other than confirming that he did, in fact, want to pursue industrial research. They were neither crucial for building his research portfolio nor obligatory for landing his permanent position at Agilent.

Science postgraduates, especially those in the biological sciences, often see postdocs as a way to continue and refine their research, learn to run a laboratory and develop a broad, deep collaborative network. Flatt is one of many early-career physicists in the United States who dismiss that idea. Although researchers in the biological sciences may have to take multiple postdocs before landing their first permanent post, the landscape is shifting for physicists. Nearly 70% of physicists who earned their degree in 2004 took a postdoc, but the proportion had fallen to 56% in the classes of 2007 and 2008, according to the Statistical Research Center of American Institute of Physics (AIP) in College Park, Maryland.

One reason for the decline is that fewer people with physics PhDs are pursuing an academic research career. This is in part because there are, and have been, fewer positions to pick from. Academic hiring has been flat since 2003, says Crystal Bailey, the education and careers programme manager for the American Physical Society (APS), also in College Park. Between 2006 and 2007, about 350 faculty members left their job in physics, but in 2008, about 450 people with physics PhDs were seeking positions. Of those with physics PhDs in the United States from the classes of 2007 and 2008 who did not take a postdoc directly after earning their degree, 62% accepted private-sector positions, according to the AIP Statistical Research Center. Another 10% accepted government positions, such ▶

as at one of the US Department of Energy's 21 labs and technology centres. About one-quarter accepted academic posts.

Few private-sector or industry positions require an applicant to have completed a postdoc — even if those posts involve research. Bailey says that she rarely advises physics graduate students to pursue a postdoc, unless they are certain they want a career in academia or they need a job while they consider their options. Physics postgraduates are, she says, far more likely to get full-time permanent employment in the private sector, for which a postdoc is largely irrelevant.

About 12 industrial employers in the United States are currently advertising jobs for people with physics PhDs on a members-only section of the APS website, but none of them lists a postdoc as a prerequisite.

The applied-research nature of physics-related professions often makes a stint in academia less than useful. "A lot of physicists are just as comfortable doing engineering as engineers are," says James Duderstadt, president emeritus at the University of Michigan in Ann Arbor. "If they go to work for IBM, they're going to be doing applied research. If they work at the Large Hadron Collider, they're going to be doing applied physics," says Duderstadt, who was also a member of a National Academies panel that, in 2000, analysed the US postdoctoral experience. "Overall, it is not necessary, unless they have some experimental thing they need to learn in someone's lab that they can't learn in a PhD."

A postdoc could even be a drawback for physicists considering the private sector. Many of Europe's industrial employers prefer to hire applicants who have a PhD and a 'clean slate', says Maria Allegrini, a physicist at University of Pisa in Italy and a member of the APS Committee on International Scientific Affairs. "They want to train you in their own field," she says.

Physicists with experience in US industry warn that a CV with three or more academic postdocs can create the impression that the applicant had hoped for a career in academia and does not really want one in industry. "We want to find someone who's charged up with enthusiasm to work for our company," says Jim Hollenhorst, Agilent's senior director of technology, who regularly hires physics postgraduates. "So don't do three postdocs, not find an academic job, and then apply here."

"The applied-research nature of physics-related professions often makes postdocs less than useful."

Having multiple industrial postdocs could also be detrimental in some cases. If a researcher completes a two- or three-year postdoc at a company — requiring a significant training commitment from a senior researcher — and then leaves to do the same thing somewhere else, he or she may be viewed negatively by subsequent industrial hiring committees. But the outlook is also employer- and location-dependent, notes Dipali Bhatt-Chauhan, international-relations manager at the Institute of Physics in London. British industrial employers often view candidates with several industrial postdocs as having greater skills and knowledge than those who have done one or none, she says. "Employers would be more likely to hire that postdoc."

C.GRAINGER

Anne Goodsell says a postdoc can help young physicists expand their network and publish more.

SMART PURSUIT

The requirements are different for those seeking a government or academic research post, including at US liberal-arts colleges. Catherine Crouch, a materials physicist at Swarthmore College in Pennsylvania, completed two postdocs at Harvard University in Cambridge, Massachusetts, where she earned her PhD. In the first, she focused on physics-education research, with some teaching duties; in the second, she specialized in experimental research in a liberal-arts environment — important at Swarthmore, a liberal-arts college that heavily weights faculty research. As well as honing her research, she says, the fellowships taught her how to run a lab independently — and signalled to potential employers that she was capable of such. "When academic hiring committees are reviewing job applications, they look for a postdoc as evidence that you've had this kind of responsibility — how to run a research programme, how to pick good projects, how to decide what equipment will serve you well," she says. "There are all these meta-questions that don't necessarily come into your arena as a graduate student."

A postdoc expands young physicists' networks far beyond what they can typically achieve as a doctoral student, says Eric Jensen, chair of Swarthmore's physics and astronomy department. "It gives you the chance to build more collaborations and develop a network of colleagues at other institutions that you can be in touch with and work with," he says.

Postdocs can also be useful for those who are uncertain of their pathway or who want to pursue academia but are out of sync with the academic year hiring cycle. Anne Goodsell, an atomic and optical physicist at Middlebury College in Vermont, says that people who earn their PhD around June, for example, and are aiming for a career in academia, can generally apply for posts starting only during the following semester. In the meantime, she says, such postgraduates, as well as those who are not sure of their direction, can take a postdoc to maintain existing contacts, establish new ones, publish more, gain expertise in a subfield and sustain research momentum while waiting to apply or deciding what path to take. "It makes a lot of sense to take a postdoc to fill that gap," Goodsell says.

A postdoctoral fellowship at federal labs in Europe and the United States may sometimes lead directly to a full-time permanent position. Mary Anne With, a postdoctoral adviser at Los Alamos National Laboratory in New Mexico, says that 80–90% of the lab's technical positions are filled by former postdocs. Joseph Bernstein, an astrophysicist and postdoc at Argonne National Laboratory in Illinois, who is on his second renewal and fourth year, is considering either a consulting position or a third extension of his postdoc. The extension, he says, would be equivalent to a tenure-track assistant-professor post and is likely to lead to a permanent position at Argonne — and it pays well for a postdoc position. He declined an offer a couple of years ago for an assistant-professor position that would have meant taking a 10% pay cut. By extending his postdoc, Bernstein believes he will develop the technical computing and programming expertise necessary to become staff. "It's a good opportunity," he says.

So how does a student decide whether to pursue the postdoc path? If postgraduates are planning for a career in academia, it is still a requirement, acknowledges Bailey. But for those who remain uncertain, doing one postdoc is unlikely to damage anyone's budding career, even if they decide to head for industry, says APS executive officer Kate Kirby. "It increases the number of connections you have in your field," she says. "It makes it possible to get further letters of recommendation from a broader constituency — a tremendous advantage that can help you collaborate, get a grant or get a position." ■

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