Commentary: Thinking of moving from academia into industry? Here are some things to consider FREE

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Commentary

Thinking of moving from academia into industry? Here are some things to consider

DAVID RAHMLOW, the author of this commentary, works at a company that focuses on using light-scattering tools to determine characteristics of nanoparticles and macromolecules. The intensity and angular distribution of scattered light depends on particle size and molar mass. The diffraction pattern of transparent particles, such as those made of polystyrene latex, is a consequence of Lorenz–Mie theory, and orange sunsets and underwater scenes owe much of their drama to Rayleigh scattering. (Underwater image courtesy of Steve Trainoff.)

I've been working in industry for about 10 years. I've always enjoyed building things, especially scientific apparatus. But putting my skills to use in industry, rather than academia, was not always a foregone conclusion.

I am currently an R&D staff scientist at Wyatt Technology Corp—a family-owned company based out of California that consists of 160 people worldwide—which is primarily focused on the use of light scattering to measure particle size. As a PhD candidate, however, I studied experimental atomic, molecular, and optical physics, and after grad school, I wasn't quite ready to leave the academic world.

After all, it has many comforts that private industry, particularly small businesses, can't easily replicate. Weekly departmental seminars can give those in academia a deep connection to the broader physics community. While local professional society meetings can offer people in industry opportunities to explore and network, they are narrow in scope compared with what universities can offer. One of the most significant challenges I've experienced since starting an industry career is the lack of access to scientific journals. Although open access is gaining ground, it is still uncommon, especially for older papers.[1] And when you work in industry, not only is it harder to get information, but intellectual property strategies may limit what information you can give.

If you're unsure about leaving academia, like I was, then you can always stay a bit longer before making the switch to industry. Spending a couple of years doing a postdoc isn't necessary for a job in industry, but it can be a valuable experience. In my case, a postdoc was my first time mentoring others: My responsibility was to work with half a dozen students—in contrast to graduate school, where it was to pursue research for my dissertation. Many postdoc opportunities are available. Statistics from the American Institute of Physics (the publisher of Physics Today) show that they are the choice of about half of physics graduates after completing their PhDs. Only about a fifth go directly to a potentially permanent job in the private sector.[2]

The problem with getting postdocs is that they often need to be followed by other postdocs before one can become a university faculty member. During my postdoc tenure, I realized that I wasn't willing to move around to other positions in the coming years in the way that the academic world might have required of me. It was time to find somewhere to settle down. And for me, that meant looking for a job in industry.

In my case, finding Wyatt was serendipitous. I wasn't planning to attend the American Physical Society March Meeting in 2012, but since it was nearby, on a whim I uploaded my resumé to the job fair. Less than half an hour later, I received an email inviting me to interview with Philip Wyatt—the company founder—who happened to be attending. We launched into a pop quiz after introductions. "Why is the sky blue?" "How does a laser work?" "Where does helium come from?" (I'm told the most unique answer he's heard for the last one was "Kansas.")

Job seekers may find that it is hard to come across opportunities at smaller companies because of the sheer number—and relative obscurity—of them. General-purpose job search engines, such as Indeed and Monster, can be overwhelming in their lack of specificity. Resources such as the American Physical Society jobs board and Optica's WORKinOPTICS website are focused on physics-related

jobs, but only a subset of industry employers regularly use them.

So what might you do in industry? It's possible, but rare, that you may stay in the same field in which you did your doctoral research. Your field may have bountiful commercial applications, and you may find a company that sells specialized apparatus for them. But if you can't, don't despair. Chances are that the skills you learned when completing a PhD can still be put to good use.

In my case, I've found that the skills from experimental atomic, molecular, and optical physics are well suited to product development. An experimental physicist is a jack-of-all-trades, and understanding how all aspects of a system interact is critical when developing a product. Projects start with an analysis of the fundamental operating principles, but implementation depends on an intuition for the art of mechanical engineering, optics, and electronics. That insight is necessary when working with the engineers that will help bring the project to fruition. Experience in the machine shop and electronics lab has helped me to write more accurate specifications and better assess the elegance of a proposed solution.

If you choose to make the switch from academia to industry, consider what you value in a career. Are you looking for work–life balance? Is it important to see the impact of your work? Do you enjoy tackling every sort of problem, or do you see yourself as a specialist? Company size and culture has an impact on each of those. Last year's careers issue (Physics Today, October 2021) explored a few of the options in private industry. Fittingly for physics, it covered businesses of the smallest and largest scales—from entrepreneurship (see the article by Christine Middleton, page 42) to the Ford Motor Company (see the article by Mike Tamor, page 32). But I'd like to add that there's still plenty of room in between. Small and midsize businesses may not have the name recognition of Alphabet or Apple, but they make up the bulk of the economy and can be rewarding places for physicists to work.

The informal term "small business" is not well defined. For the US Small Business Administration, the definition depends on the field.[3] Personally, I like the idea of "Dunbar's number," approximately 150, which is a proposed limit on the number of stable relationships one can maintain. A business with that many employees is still small enough to have much of the nimbleness of an entrepreneurial startup but is not so small that added responsibilities take a toll on work–life balance. Such a business can be large enough to have resources, but it is small enough that its employees are more than "shiny cogs" in the machine, and they can see the impact that their contributions make.

If you're interested in continuing to put your physics skills to use, consider the opportunities that industry has to offer. There's more out there than you may think.

References

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2. AIP Statistical Research Center, *Initial Employment—Physics Bachelors and PhDs: Classes of 2019 and 2020* (March 2022).
3. US Small Business Administration, "Table of size standards" (14 July 2022).

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LETTERS

Fusion power's future

In the review of *The Star Builders: Nuclear Fusion and the Race to Power the Planet* (Physics Today, October 2021, page 64), reference is made to the old joke that controlled fusion power is 30 years away and always will be. I would like to update that observation, and perhaps make it more rigorous, by noting the history of controlled fusion research dating from the 1950s. In my 60 years of association with plasma physics and both magnetic- and inertial-confinement fusion, I've heard countless briefings and promises: When the research programs were 10 years old, the reactor was 10 years away. After 20 years, it was 20 years away; 30 years on, it was 30 years away; and so on. Now a commercially viable reactor could be more than 50 years away. It appears to be a self-similar problem, where the only time scale is the elapsed time.

Such behavior is not restricted to controlled fusion. The same joke, including