

Consulting can be stimulating and lucrative for physicists

Skills from physics training transfer well to a career that comes in many flavors.

If you need someone to tell you what to do, consulting is not for you," says Stephanie Chasteen, a condensed-matter physicist turned physics education specialist who makes a living with her one-woman physics education consulting business. On the other hand, for physicists who are self-motivated, organized, and communicate well, consulting may be an attractive option at any career stage—from freshly minted bachelors or PhDs to mid- or late-career professionals who want to try something new.

For early-career scientists, consulting firms can be a good fit. As a fifth-year graduate student at the University of Michigan studying magneto-optical phenomena with ultrafast lasers, Elizabeth Dreyer realized she didn't want to spend the rest of her life "alone in a dark basement." After earning her engineering PhD in 2018, she joined Boston Consulting Group. It is one of the Big Three strategy consulting firms, along with McKinsey &

Company and Bain & Company; each employs thousands of consultants. Now, after four and a half years, she is moving on. Over the same period she might have spent as a postdoc, she says, "I learned more than an MBA's worth of knowledge and got paid four times as much." By the end she was earning more than \$200 000 a year. The network she has built through consulting and the assistance the company provides its alumni, she adds, give her confidence about finding her next job.

Another mode of consulting is the side gig, which some active and retired faculty and research lab scientists engage in. Such work can supplement income or serve as a low-risk transition to a full-time consulting career.

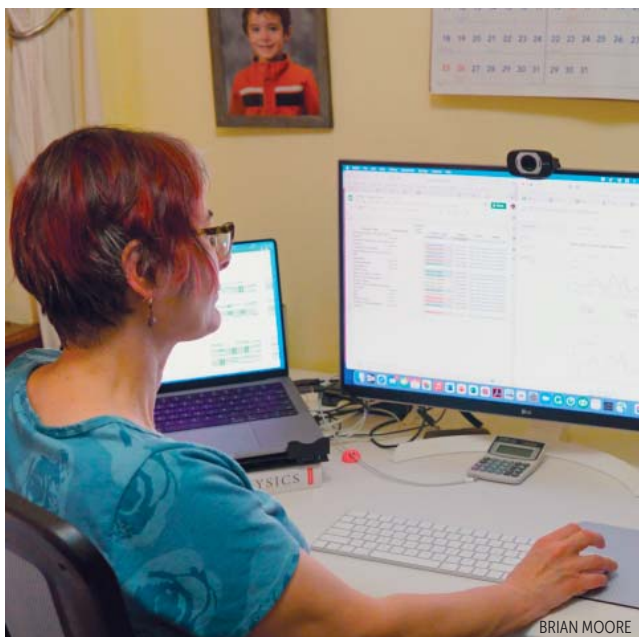
Fast paced and project based

At consulting firms, consultants regroup for each project. A project can last days to years, but about 12 weeks is

common. Consultants dive deep into questions for their clients: Is the timing right for an automaker to move into the electric-vehicle market? What's the best way to market a particular drug? What types of investments in digital transformation would best benefit an oil company? How can a manufacturer produce steel more efficiently?

INDEPENDENT CONSULTANT

Stephanie Chasteen says her work is intellectually stimulating and impactful, lets her "geek out on statistics," and allows for work-life balance.



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Consultants spend their time analyzing data, interviewing people, participating in meetings, formulating strategies, and putting together presentations. They may also implement recommendations, seek projects and clients, and engage in professional development. At the big firms, the culture is often “up or out,” and after a couple of years consultants who stay are promoted to managers. Before the pandemic, traveling to a client’s site was the norm; consultants were often away from home Monday through Thursday. Now some are traveling again, but remote meetings have become a staple.

After earning his PhD in condensed-matter physics at Harvard University in 2014, Michael Yee joined McKinsey and stayed eight years. At the firm, “to work in condensed-matter stuff, I’d have had to travel to the West Coast or internationally,” he says. Instead, to stay near his home in Toronto, he chose to focus on banking and insurance. He worked on strategy and business transformation. “My teams would perform complex analytics on the market opportunity. I would help clients hire people. For one client, we launched a new business brand.”



WOODY CARRICK

JOHN BARENTINE measures the surface brightness of a streetlight with a luminance meter. He saw an opportunity to consult for parks and municipalities that want to improve their lighting or be accredited as a dark-skies location.

While working as a consultant, Yee says, “I used my creative brain and my analytical muscles. I found it exciting.”

And he felt good about the social impact. Some of the products his clients were rolling out were aimed at people in under-

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served markets who didn't have access to typical banking or lending products. This past September, Yee left his consulting position to become vice president of financial services for Canada Post because he "wanted to run a business rather than just advise."

Maggie Seeds joined Clarkston Consulting, a North Carolina-based firm with about 300 consultants, after earning her bachelor's in physics at Appalachian State University in 2012. "You hear that physics degrees open doors, but I didn't know what doors," she says. She was drawn to consulting when she saw, through the interview process, that she could get results faster and see the impact faster than in research. She first completed a boot camp that the firm offered. "It was like consulting 101," she says, "and we were paid."

"With consulting, you never know what type of project you'll be on next," says Seeds. At Clarkston, the teams for each project are put together by an in-house group, so the individual consultants don't market themselves internally like at some larger consulting firms. Most of her projects have involved helping companies implement and customize software. But a few years ago, Seeds and two colleagues started an analytics team within the firm. They work with clients on projects related to data storage, data quality, visualization of historical data, and predictive algorithms, and they create apps for clients to integrate predictions into their businesses.

In shifting into data science, Seeds says, "I was looking for a new professional challenge. I like being part of the decision making on what to build and then building it." One tool Seeds made uses artificial intelligence to recommend the respective quantities of black beans and pinto beans that her client should stock. The forecast was based on such input as the neighborhood, season, and previous sales.

As a graduate student working on the thermodynamics of single molecules at North Carolina State University, Zubair Azad was on the path to becoming a professor. But after stints as a postdoc and as a Fulbright scholar in Barcelona, Spain, he wound up at Deloitte in 2019. The appeal of consulting, he says, included the possibility to make a difference through advising decision makers, implementing recommendations, and learning new things with each project.

Early on Azad worked on digital issues in R&D, manufacturing, and supply chains in order to help companies commercialize products. He has since pivoted to establishing public-private partnerships that address societal needs. In his consulting role, he was recently named a fellow of the World Economic Forum, where he is involved with developing a framework to provide equitable access to vaccines through regionalized vaccine manufacturing. "Consulting is whatever you make of it," he says. "You can re-engineer your career as your goals and ambitions shift over time."

Sometimes, Azad says, he uses his technical skills and physics know-how in his consulting. And his PhD gives him "instant credibility" with clients and colleagues. But the softer skills are essential. The ability to communicate is "going to make or break your career," he says. "How are you with people management? Are you a good leader? Can you forge consensus?" That most important skill for consulting is the one that is least addressed during the PhD, he says.

Transferable skills

Although it can be hard to see from a researcher's vantage, scientific training builds many of the skills needed to be successful as a consultant, says Manu Lakshmanan. He worked at McKinsey for a year and a half after earning his PhD at Duke University in biomedical engineering in 2015 and doing a postdoc at the National Institutes of Health. Physicists have experience developing quantitative models and making approximations, he says. Knowing how to search the literature and communicate in writing are also transferable from academia, Lakshmanan says. And presenting talks and posters at conferences is not that far from persuading colleagues to work together on a project or convincing clients to consider implementing recommendations.

Among the skills that he had to hone when he entered consulting, Lakshmanan says, were being comfortable with qualitative data, working in teams, marketing himself within the firm, and explaining results on an impromptu basis. For physicists thinking of moving into consulting, he says, "extroverts can be more confident that it's a good move. I'm an introvert. It was a challenge."

Some people find the merry-go-round of colleagues and managers frustrating.

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Still, many physicist-consultants say their colleagues and clients are a favorite part of their jobs. “The people I get to work with are not only smart and capable but kind and compassionate,” says Azad. “I now care more about who I work with than what I do.” Less attractive are the long hours—80-hour work weeks are common. “Work-life balance is a perennial problem,” he says.

Independent consultants

By contrast, independent consultants point to work-life balance as a perk. Chasteen’s education consulting largely involves her serving as an external evaluator; many grants and proposals require such oversight. She helps get projects underway, collects data, and provides feedback, mostly in the areas of departmental overhaul and faculty uptake of innovative teaching techniques. For example, in an analysis of PhysTEC, which promotes K-12 teaching as a career for physics graduates, she found that the program would benefit by expanding its focus on master’s recipients.

Chasteen’s consulting projects extend over years, which makes it possible for her

to organize her time and maintain a consistent income. She chooses how much to work—typically 35–40 hours a week. She also chooses who to take on as clients.

“I don’t work for people who just want to check a box,” Chasteen says. “I work for clients like the American Physical Society and the American Association of Physics Teachers, who take the data I provide to make improvements.” She started her business in 2009 after more than a decade of immersing herself in physics education issues. Having expertise in a niche area is typical for physicists who make a go of independent consulting.

Astronomer John Barentine launched his consulting business in summer 2021. From years working at the International Dark-Sky Association, a nongovernmental organization, he recognized a need he was well-suited to fill: advising parks, nature reserves, and municipalities on how to improve their lighting. “If they receive accreditation for dark skies, it’s a badge of pride and it drives tourism,” he says. “Some clients just want advice. Others want help writing bylaws or deeper involvement in the implementation.” Barentine says he’s had months where he

brought in more than enough to cover expenses and had months with no work. It’s too soon to see whether he’ll succeed long term, he says.

Scot Kleinman is also new to independent consulting. He left his job as associate director of the Gemini Observatory last spring to go solo. “I was feeling confined in a normal job environment,” he says, “and I was not having opportunities to work in the breadth of what I could offer.” So far, the demand in astronomy is keeping him busy. “Sometimes it’s a matter of making connections for a client. Sometimes they need fresh eyes.” He does technical writing, develops materials for funding proposals, and has stepped in as interim manager for an instrument under construction for the Thirty Meter Telescope.

Kleinman says he finds the work more meaningful than he expected. “I get paid for doing interesting things that I’m good at and that people care about. Nobody hires a consultant to do work that isn’t valued.”

After 24 years at NIST, Carl Williams retired in late 2021 and launched CJW Quantum Consulting. “I wanted to more



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strongly engage and help make the science transition to applications than I could from within the government," he says. His clients include professional societies and companies, which he advises on market strategies, policy, and export controls related to quantum technologies.

Given that he already had a pension plan, Williams wasn't worried about money, but he says he's making plenty. Other former government scientists who have become consultants told *PHYSICS TODAY* that they bring home incomes in the several-hundred-thousand-dollar range. (See the article by Williams, *PHYSICS TODAY*, October 2022, page 50.)

As major pluses, independent consultants point to the flexibility of their schedules, being their own boss, and the impact they can make. Chasteen also likes that she can take the time to immerse herself in a topic. "My faculty colleagues are spread thin and juggling so much," she says. "I can dig much deeper into one thing at a time, and that's satisfying."

On the downside, many of them dislike the bookkeeping and rate-setting parts of their responsibilities and having to arrange for health insurance, social security, and retirement. Time management and negotiating skills are essential, they say.

Side hustles

Daniel Lathrop, a physics professor at the University of Maryland, is occasionally approached by companies for help in nonlinear dynamics and neuromorphic computing. University policies on consulting vary; his employer permits faculty to devote up to a day a week to consulting. It's important to be transparent with the university and to avoid conflicts of interest, Lathrop says. Consulting "even a couple of hours a week is a substantial supplement to income for a midcareer academic professional," he says.

Laura McCullough, a physics professor at the University of Wisconsin–Stout,



THE SEVEN-STEP PROBLEM-SOLVING strategy at McKinsey & Company bears resemblance to the scientific method. (Based on the 13 September 2019 episode of the McKinsey Podcast.)

also consults on the side. But she's looking to build up consulting as a possible full-time career. She evaluates departmental climate from a DEI (diversity, equity, and inclusivity) point of view. In that role, she conducts climate surveys and site visits and reviews departmental bylaws. She tailors surveys to a given department's request. "I was doing occasional gigs and discovered I really liked it," she says.

McCullough is motivated to expand into consulting because resources are low at her state school. And workloads have grown, she says. She is a full professor who has been at her institution for 22 years and makes \$80 000. "I love my job," she says, "but looking ahead, consulting may ease retirement."

"Right now it's a side hustle," McCullough says. "I don't think I could make a living at this yet. I'm still building up." But DEI has been a passion for 25 years. "I love helping organizations and departments make life better."

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