

SO YOU WANT TO BE A PROFESSOR!

You've finished your PhD. You're almost done with your postdoc. Now what? If you aim to stay in academia, read on.

Matt Anderson

Several studies have addressed the job prospects for young physicists and other professionals, and on the current state of physics enrollments and degrees (see page XX). In addition, a few sources have detailed how to survive in science¹ and how to look for an academic position.² These sources are all very good, but when I started looking for an academic job in the fall of 1999, I still felt unprepared for what I was getting into. The academic job search is a monumental endeavor, an unbelievable amount of work. Nobody told me that.

But I wish someone had. So, in this article, I tell the story of my job search in the hope it will help other would-be physics professors in their quest to land a tenure-track position. The good news is: I did. The better news is: You probably can, too. Here, I recount what I learned going through this process, including the mistakes I made and the successes I had.

First, a little about my approach. I applied to 42 schools all across the US—from large research universities to liberal arts colleges. Why so many schools? The horror stories I had heard from job seekers in years past prompted this scatter-shot mode of job hunting. My goal was to secure a position. Somewhere. In retrospect, this approach was probably overkill, but it helped me get exactly the position I wanted all along.

Here are the statistics from my job search. I read through 300 ads, applied to 42 schools, made the short list at 13, went on five interviews, received three offers, and accepted one—from San Diego State University, which you can see in figure 1 with me in the foreground.

Just for fun, I created a plot, reproduced in figure 2, of the number of positions versus application round. The red circles are the real numbers from my search and the blue line is an exponential fit to the data (with spooky agreement). Obviously, at round 4 you want to end up with a number greater than or equal to one, so you should adjust the number in round 1 accordingly. (However, it's a bit tricky to figure out your personal decay constant ahead of time.)

Fortunately, the situation right now is good for job seekers. Schools still attract a large number of applicants (50–300), but these numbers are down considerably from previous years. In fact, most schools report that applica-

tions have decreased by a factor of three. Furthermore, many schools are rebuilding, and the number of physics faculty approaching retirement is large. At one school I applied to, 90% of the faculty was more than 60 years old. Clearly, schools like this will be hiring steadily in the next few years.

Who is hiring?

The first question you should ask is, Who is hiring? This may seem obvious, but finding out the answer is not always so easy. Networking is one way to find jobs. Ask your adviser if he or she knows of departments that are looking to recruit new faculty. Go to conferences and check the job boards.

Although this approach isn't bad, it can be very time-consuming. Fortunately, most colleges advertise in the October, November, and December issues of PHYSICS TODAY. When I did my search, I found approximately 300 separate tenure-track positions in these issues. Due dates for applications vary, but most fall between 1 November and 15 January. These dates should be taken seriously; some schools will not consider applications received after the due date.

Do not apply to all the ads you see! Try to target schools that are looking for your specialty. Not only will you have a much better chance of getting the position, but ultimately you will be happier once you get there. You should also try to target places where you might want to live. If you would be miserable living in a certain area, don't waste your time applying there. Read the ad carefully for application instructions. Some schools may want three letters of recommendation, whereas others request five letters, plus graduate and undergraduate transcripts. They wrote these instructions for a reason, so give them a thorough read. The box on page XX reproduces the original ad that led me to my current job.

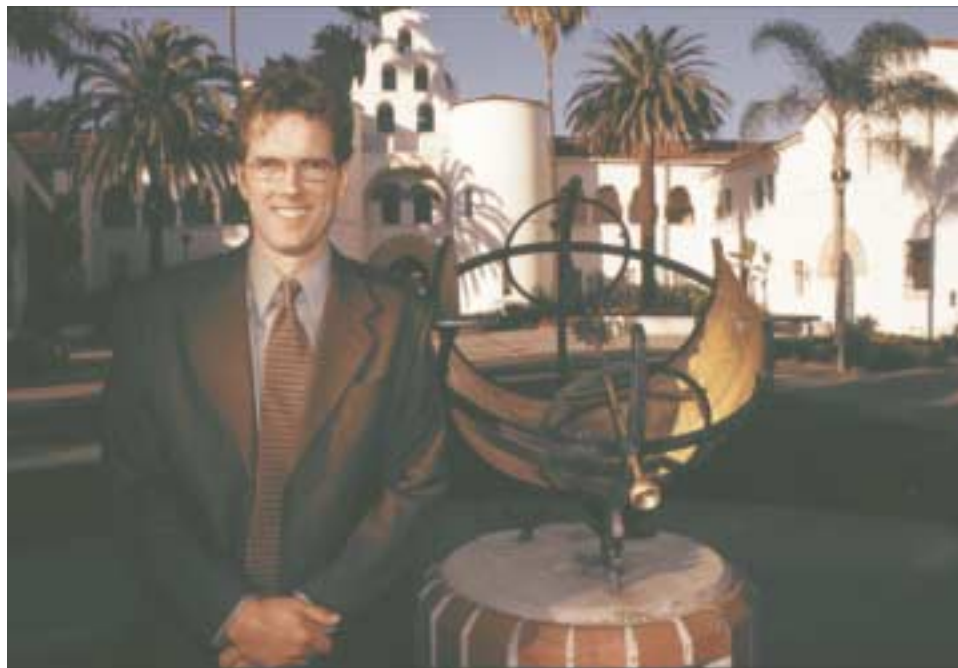
Your application

The application is critical to getting your foot in the door. It is your first contact with the colleges, and—you hope—not the last. In general, an academic job application consists of five primary components: (1) cover letter, (2) curriculum vitae (CV), (3) research history and plan, (4) teaching experience and philosophy, and (5) letters of recommendation.

The **cover letter** is the very first piece of information your prospective employers will read. As such, it should state plainly who you are and what position you are

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FIGURE 1. THE AUTHOR, wearing his interview suit and standing on the campus of San Diego State University, his current academic home.



applying for. It should be no longer than one page, and it should be as personal as possible. Call the school and find out who is the chair of the search committee, and address the cover letter to that person. Make sure you indicate how your interests and the interests of the department will mesh nicely. Use proper English, be cordial, and seek critical comments from your colleagues before sending that cover letter out.

Curriculum vitae is a fancy Latin phrase for résumé. Its translation, “the course of life,” indicates what your CV should address. What have you done in the course of your life? You should concentrate on the professional aspects of your life, primarily in reverse-chronological order. I used a fairly standard format, which I outline below.

- ▷ Objective: What sort of position are you looking for?
- ▷ Education: What are your degrees?
- ▷ Professional Experience: List your positions along with research and teaching accomplishments.
- ▷ Professional Society Activities: Are you a member of the American Physical Society or any other learned society? Have you reviewed scientific publications?
- ▷ Refereed Publications: List your publications.
- ▷ Patents: List any patents you hold or patents pending.
- ▷ Conference Proceedings: List any of your published conference proceedings.
- ▷ Presentations: List the talks you have given. Mention if they were invited talks.
- ▷ Awards and Honors: List any noteworthy awards or honors you have received.
- ▷ Personal: List any personal information you would like to convey. Do not be afraid to make it silly.
- ▷ References: On a separate page, list five people who are willing to act as references for you. Include your current boss, thesis adviser, and professors from other schools.

This history part of the **research history and plan** should describe your major research accomplishments as a graduate student and thereafter. In this section of your application, tout your skills and stress the sophistication of the research involved. Humility is a great personality trait, but it has no business here. Do not be modest. If your work was groundbreaking, say so. If you hold a world record for a particular measurement, emphasize it. If one of your papers has been cited a hundred times, mention it. This section should be a page or two long.

Devising the research plan requires serious thought. In it, you should be able to answer the following question:

What are your plans for the future? This is critical to your candidacy because the members of the search committee want to know how your research will fit into the department’s existing research program. They want to know how it will involve undergraduate and graduate students. You need to be specific. Include plans for what you will do in the first year, the second year, and five years down the road. How much money will you need? What will you require for startup funds? Amounts of startup funds vary greatly among schools, so it is wise to have some idea how much money is available before you write this section. (You don’t want to tell them you need \$300 000 for your research and then find out they can only afford \$50 000.) After startup, how much money will you need to keep your research going? If this is a substantial amount, where will you find external support? It is a good idea to know the specifics of various funding programs, including the names of the people who run them. Schools react favorably when you have taken the initiative to talk to a funding agency representative personally.

In your **teaching experience and philosophy**, describe any courses you taught or for which you served as a teaching assistant. Be specific and illustrate the details of the course. What was the subject matter, the class size, the level, and so on? Did you have interesting in-class demonstrations? Did you go on field trips to other research facilities? How did you get the students motivated? Were your teaching evaluations particularly flattering?

As for your teaching philosophy, you should discuss your approach to teaching. What is special about your style? In your teaching experience, what methods seem to work well? For instance, by providing lecture notes myself, I make it possible for my students to pay full attention to what I explain in class. I also use a large number of in-class demonstrations. In one class, we used a pulsed diode laser and a fast detector to measure the speed of light in the classroom (an ordinary size classroom!). I had the students perform the measurement and calculate a value for the speed of light. To their surprise, they obtained a value for c that was within 2% of the accepted value.

Sharing stories like this will help convey your enthusiasm for teaching, so be sure to cite specific examples of what you have tried. Remember: the people reading this application have probably read through a hundred or so already, so obtuse statements about the “learning process” will likely not advance your case.

Schools typically want three **letters of recommendation**. Although well-known references may help, it is more important to get positive letters from people who know your work. The obvious choices are the professors with whom you have worked the closest (your adviser, post-doctoral boss, collaborators, and so on). If possible, it also helps to get references from outside your current location. This shows your reach in the scientific community. (When you are soliciting letters from your references, you might consider telling them the due date is two weeks before the actual deadline. We all know what professors’ schedules are like.) Send your references a small thank-you gift. Writing letters of recommendation is hard work and you want them to know you appreciate their efforts.

Your interviews

The interview process generally involves two steps: the phone interview and the campus visit. Search committees typically meet in January to start whittling down the list of applicants to a smaller group for phone interviews. After phone interviews, they further trim this list to a group of four to six candidates, who are invited to campus for personal interviews. This is the so-called short list. When you’re waiting to hear, phone calls mean good news, letters mean bad news.

In January or February, you will receive a call or an e-mail message requesting a time for a scheduled phone interview. The phone interview may take one of several formats. Some are one-on-one and others are with a committee via speakerphone. This second type is particularly difficult to navigate because of the awkwardness of the speakerphone, which makes it difficult to gauge the committee members’ reactions and impossible to discern who is actually questioning you.

In either case, however, it is important to do your research on the school before the phone interview. The World Wide Web is obviously very useful here. Know the names of the professors and their research areas, what the program offers, how many students they have majoring in physics, and so on. Also, try to anticipate their questions and come up with suitable answers ahead of time. In my first interview, I was caught off guard by their very first question: What interested you in this school? (“Uh, you were advertising?”)

Other questions during the phone interview often cover your application materials: Tell us about your teaching experience, what research you will do here, what equipment and startup funds you will require, and so on. When answering, use specific examples to augment what

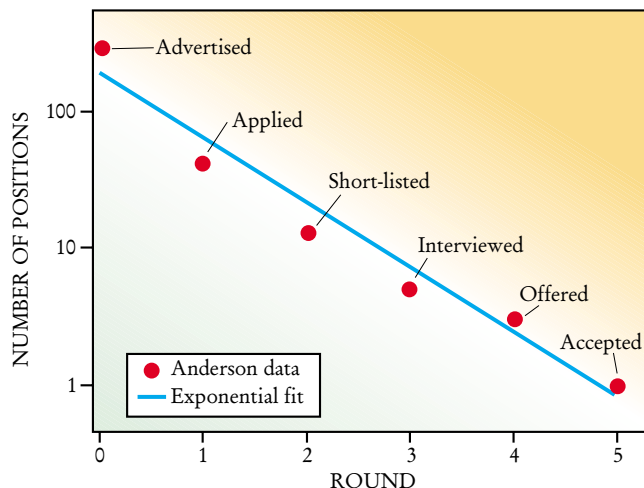


FIGURE 2. THE JOB SEARCH PHENOMENON. The number of available positions is shown versus application round, with real data (red circles) and an exponential fit (blue line).

they already know from your application. After the phone interview, they will generally tell you within two weeks if they want you to come for a campus visit.

Most campus visits happen in late February and March. When you are invited, the school will suggest a few dates for your interview because they need to arrange times with the search committee, the dean, and other people with notoriously full schedules. Remember that different schools are on different schedules, so you probably won’t receive invitations at the same time. I urge you to go on no more than five interviews, as they can be very taxing.

What follows is the general layout of the interview trip and any advice I can offer.

The school will pay for your trip. Usually, it’s up to you to reserve the plane tickets and pay for them, but the school will reimburse you. Keep any receipts for expenditures like airfare, taxis, hotel, or food, as the school will need these for the reimbursement.

Along the way you will no doubt meet some interesting people, such as the taxi driver I met who was recounting the bets he had made on college basketball games. There appeared to be a positive correlation between his financial success and his speed down the freeway. When he told me of a game in which he covered the spread, his speed would increase. If he lost the bet, he would slow to a crawl. It was an interesting trip, and it turned out that many of the graduate students at this school had experienced the same driver, so we enjoyed sharing stories.

The main event of your visit is your colloquium. This talk should be about your recent research and should target the audience carefully. Do not make the talk too difficult to understand! There will be students at the talk and keeping them awake is critical. Include humor in your talk. Don’t be afraid to entertain them a little, and remember that each audience you encounter on your campus visits is brand new, so you can repeat the same joke (but only if it works the first time). Excellent advice for what not to do in your talk can be found in Peter Sigmund’s letter, “Fifteen Ways to Get Your Audience to Leave You” (PHYSICS TODAY, August 1998, page 86).

One of the things the search committee is interested in is your composure before an audience. At one of my talks, I wondered if they were out to rattle me by sabotaging my presentation at every turn (they weren’t). More could not have gone wrong: The projector bulbs were burned out (both of them), marching music erupted in the middle of my talk (the school band was practicing outside), it took 15 minutes to turn on the VCR, and finally, when I tried to start my video, Charlie Chaplin showed up instead. These moments are either incredibly awkward or chances for levity, depending on your attitude.

At liberal arts colleges, they might also ask you to teach a mock class. They will ask you to prepare a one-hour lecture on a topic of your choice and then give it to the students. At several of my interviews, I prepared a

What to Look for in a Job Ad

The original job ad that eventually led me to my job at San Diego State University ran in the October 1999 issue of *PHYSICS TODAY*. It is reproduced here.

When I started looking for a job in the fall of 1999, I found a total of 300 ads for academic jobs, but I responded to only 42 of them. Here, highlighted in yellow are the key phrases in the ad that attracted me. The first thing I noticed was that it was a tenure-track position (not all of them are, so read ads carefully). Second, they were looking for someone in experimental optics, which is exactly my field. I then noticed that it was a position at San Diego State University, a school I was fairly familiar with because I grew up in San Diego (there was, naturally, a big incentive to move back "home"). They wanted the candidate to "initiate a vigorous research program," but also have a strong commitment to teaching. Both were part of my agenda as well: I wanted a balance of research and teaching. Finally, they were looking for someone with postdoctoral experience, which I had.

These ads are written carefully by the department to describe the ideal candidate. In this case—and fortunately for me—it proved to be a surprisingly good match between the goals of the department and my experience.

Tenure-Track Position in Experimental Optics

The Physics Department at **San Diego State University** anticipates the availability of a tenure-track Assistant Professor position in experimental optics, beginning in the Fall of 2000. The Department offers both Bachelor's and Master's degrees in Physics. The new faculty member will be expected to initiate a **vigorous research program** involving undergraduate as well as M.S. graduate students. Candidates must also demonstrate a **strong commitment to excellence in teaching** at both the undergraduate and graduate levels. Currently, the primary research focus of the optics program in the department is laser physics and optical pattern recognition. Candidates with interest in these areas, or in complementary areas such as adaptive optics, non-linear optics, optical techniques applied to material science, or remote sensing, are encouraged to apply. Applicants should have a Ph.D. in physics and **postdoctoral experience**. Additional information about the availability of the position, the department and the optics program can be found at <http://www-rohan.sdsu.edu/dept/physics/>. Applications should include a letter of interest, a curriculum vita, teaching experience, a brief statement of future research plans, and the names of three references, who will be contacted directly by the search committee. Applications should be sent to: **Chair, Search Committee, San Diego State University, Physics Department, 5500 Campanile Drive, San Diego, California 92182-1233**. In order to receive full consideration, applications should be received before **December 1, 1999**. *SDSU is an equal opportunity employer and does not discriminate against persons on the basis of race, religion, national origin, sexual orientation, gender, marital status, age or disability. Women, ethnic minorities and persons with disabilities are encouraged to apply.*

short lecture on the derivation of Snell's law from Fermat's principle of least time. Then, at the conclusion of the lecture, I invited the students to come up and experiment with "Jell-O™ Optics" (for a description of this activity, see ref. 3).

Jell-O™ Optics is a fun demonstration in which students can very easily observe the refraction of a helium–neon laser beam as it passes from air into Jell-O. I had the students calculate a value for the index of Jell-O based on Snell's law, and when they observed an index near that of water, I asked them why this was so (Jell-O is primarily water, of course). This sort of demo is a great activity because the students get their hands dirty while doing physics, but it does require some planning. Generally, I made Jell-O the night before in my hotel room, but on one visit I made it with the students, which was a nice way to get to know them in a casual setting. Remember that the search committee weighs the impressions of their students heavily, so if you can deal with the logistics of this sort of endeavor, the payoff can be great.

Campus visits generally last two days, and throughout each day you will have half-hour meetings with professors, students, and college officials. It is important to have questions ready for all the people you meet. They will want to know about you, but you should also have a healthy list of questions for them. When talking to professors, you might ask them about their research and how you might be able to collaborate. When talking to the dean or president you might ask about salary, startup funds, matching funds, or the future plans for the college (their five-year plan).

When trying to decide what to wear for the interview, it is probably better to err on the side of being a little overdressed. For men, I recommend a comfortable suit and tie. The female candidates I conferred with generally wore suits—either a skirt-suit or pantsuit—stockings, and low heels. Although physicists generally dress casually, I urge you to look sharp. It is better to stand out a little because,

after all, you are the candidate and people should know it! If you're still uncertain, a good idea is to observe what the well-respected scientists wear to conferences. They generally dress in a style known as "business professional." For my interviews I brought two outfits: a suit for the day of the colloquium (see figure 1), and a shirt and tie combo for the other day. Also, wear comfortable shoes! You will be on your feet for two days straight.

The committee will take you out to dinner at least one night, so the obvious question arises: Should I order an alcoholic drink with dinner? The answer here is very simple: Follow their lead. If they order a beer, then order a beer. If they order a bottle of wine, order your own (just kidding). Obviously, if you don't drink or just don't feel like it, then don't. At one interview, we went out to a pub and had a rousing discussion about the mechanics of the little widget in cans of Guinness that recreates the creamy head of draft Guinness (I think I now understand how it works).

Remember that these people are interested in your scientific side, but also in your personality. Departments are usually very collegial and they are looking at you as a future member. At these dinners, they are trying to decide if you are someone they would want to have lunch with for the next 20 years. Do your best to interject interesting stories from your graduate school or teaching experiences (your audience can all relate).

For example, I told the story of some volunteer lectures I had given at an elementary school to a third-grade class. The lecture was on light and shadow, so I showed a movie of the 1991 solar eclipse. The kids stared in awe as the Sun completely disappeared behind the Moon. After the show, I asked the kids if they had any questions. One little girl raised her hand and said, "Um, yeah, how did you know the Moon was going to do that?" "Excellent question," I answered. "We have equations that tell us very precisely where the Moon will be at any time, so we knew on this day at this specific time, it would block the

Sun," I said, satisfied with my answer. Her eyes lit up as she retorted, "You mean, you can see the future!"

Stories like this are a great way to break the ice. Before you go on your interview trip, think about your experiences as a graduate student and I'm sure you can come up with a handful of great stories. Everybody in graduate school has blown something up!

Here is more potentially helpful advice for your trip:

▷ Pay attention to your body. These interviews are exhausting! Get to bed early, eat healthy food (not fast food, ever), and drink lots of water.

▷ Be enthusiastic. When you talk to people about your work, or the school, or your future plans, be very positive. People respond to enthusiasm.

▷ Remember people's names. This is critical. You will be meeting a ton of people and it makes a world of difference if you remember everyone's name. If you have trouble with this, practice.

▷ Do not worry about the competition. It really doesn't matter who else they are interviewing and asking just makes you look weak. Focus on yourself.

▷ Get a time frame. Find out how long it will take them to arrive at a decision, and let them know if there are constraints (such as the enviable position of having competing offers).

▷ Remember the goal of this trip: You are trying to get an offer. That's it. Don't worry about whether or not you would actually accept the offer. You don't have a choice if they don't offer it to you. The entire purpose of your trip is to get them to offer you the job.

Rejections and offers

Responses come in two forms: bad news and good news. Let's look at the bad news first.

The careful reader will notice that most of my applications ended in failure (29 of 42 schools said, "Thanks, no.") Unfortunately, learning from these failures is not very easy. I was eager to get some feedback from these schools as to why they were not interested, but was wholly unsuccessful. As a general rule, you will probably not get any feedback as to why your application was rejected unless you have a close contact on the search committee. Their reasons are usually intangible, and even if they rejected you for specific reasons, very few search committees feel comfortable giving out this information. My advice would be not to pursue reasons for rejections but to concentrate on the schools that are interested in you.

This brings us to the good news. If you have made it through the interview process, congratulations! That was a big step. So what happens now? Usually within two weeks of your interview, the committee will contact you. They will tell you if you are their top choice (the good news), and they will usually tell you if they've made an offer to someone else and are waiting to hear from that person (more bad news, at least temporarily).

If they make you an offer, they will probably want an answer within two weeks. This answer to the department comes before the dean sends a formal offer. Make sure to call people back promptly and be honest. If you are waiting to hear from someone else before you can decide, tell them so. This can be a tricky landscape to navigate because, unfortunately, different schools do not have a standard decision date. Some schools will want an answer before you have even heard from other schools. Do your best to manage these problems honestly.

If you get the offer you want from the school you want, what should you do next? Well, the first thing you should do is negotiate the terms. Salaries are generally

fixed by forces beyond the control of department chairs or deans. You should realize that there is little or no room for negotiating a higher salary unless you are coming in at a senior level.

What is negotiable, however, is everything else. Do you need more funds for startup or moving expenses? More lab space? Think long and hard about what will ease your transition from dependent to independent scientist. If you are building a lab from scratch, try to get enough startup funds to buy equipment, pay for a graduate student or postdoc, and pay your summer salary. (Remember the salary they offered is a nine-month salary; you can pay yourself during the summer on top of that.)

If they have a room for your lab already, does it have proper water and electrical supplies to power your equipment? If not, will you have to pay for this from your startup funds? If your work requires machining special parts, do they have a full-time machinist? If so, do you need to pay for special parts or is this covered by the college? What about page charges for publications, or travel expenses to conferences? If you work requires computational facilities, is there network support through the college?

There are, obviously, many questions that need to be addressed when starting from scratch. Think about these issues carefully and put dollar figures next to each item. When the dean or chair negotiates the startup package, he or she wants you to answer in succinct terms. "What do you need, and how much will it cost us?" Remember this is business, not personal. Treat it that way. If the terms are acceptable, then accept.

As soon as you are comfortable, tell other schools you have accepted an offer. Be reasonably prompt, as they need to resume their search and offer the job to the next person on their list. A couple weeks later you will receive the official offer letter from the dean. Make sure it agrees with what was discussed. Sign it and return it by overnight delivery.

Congratulations! You have joined the ranks of academia. There are, of course, a lot of demands placed on young professors, and I would encourage you to investigate books aimed at helping new faculty.⁴ You should realize that the hard part (teaching, doing research, writing grant proposals, serving on committees, surviving tenure review, and so on) is just beginning, but don't worry about that just yet. Take a moment to realize your accomplishment: People will now call you "professor." It's time to celebrate!

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