

So you want to be a graduate student?

A professor offers his advice

BY DR. ANDREW RUTENBERG

Congratulations! You've lined up graduate school with a well-funded supervisor in a growing field. You have an interesting research topic, a top-up to the base stipend, and you are starting in June to get a head start on research before your graduate courses start. Your local mentor thinks you are making a good choice, and other people in your chosen field have good things to say about your future group. You liked what you saw when you visited, you think you could have a good working relationship with your supervisor, and their other graduate students seem excited about their research (if over-worked).

No? There are things that you can start doing as early as your first year undergrad to help you decide whether and how to continue on into graduate school. Even if you are only starting to think about this in the last term of your last year, a few hours of legwork and digging can significantly improve the next few years of your life – and position you better for your future career.

Start with some inclinations about where to go, what to do, and who to do it with. Spend an evening of web surfing to various physics departments to get some/more ideas. Most Canadian graduate schools match students with professors prior to acceptance, though some have the American pool system where the match occurs after your initial course-work. For the match schools, you should be identifying individual research programmes; for the pool schools you should look for attractive research clusters. Then ask professors active in research in your department to comment on your list: where, what, and who are you missing?

Talk with local profs and grad students about their research. Their enthusiasm can be infectious, and they'll often be happy to chat about non-course related matters. Some people in your undergrad department may try to convince you to stay for graduate school, and (all things being

equal) staying can be the best option for personal reasons. Be wary of letting inertia decide: explore other departments.

While you can pick fields based on your favourite undergrad courses, a lot of interesting research directions are not in the curriculum. Some of them may not even be explored by profs at your university. Try to meet with seminar speakers (e.g. along with classmates over pizza or doughnuts) to pick their brains about where, what and who to work with. Try to distinguish fields that are interesting from ones that are also growing or that feed into careers you would find interesting. If other areas of science interest you, this is a good time to seriously consider them for graduate work. Even with basic physics training, you can bring a lot to another field!

When you've narrowed your options down to a few top profs, do more digging. Look for their recent publication histories in ISI Web of Knowledge (ask at your library if you need help with it), including how well-cited their papers are. While they may not mean a lot to you at first, you can bring them to a local prof for comments.

Start emailing your top choices to see what projects they may have in mind for a new student. If you are an A student, have fellowship funding for your graduate studies, and/or have research experience, then mention it! Finally, apply to your top choices that you feel good about. Arrange a visit to every group that accepts you, unless you already know that you won't say yes to them. Decide!

If you are starting at the last minute, be aware that application deadlines for smaller schools are often flexible. If you have another year or more, then try to get a summer research job to test the waters. Apply to people across Canada who you are interested in, both to maximize your chances and to broaden your horizons.

All of this begs the question of how to start talking, with local profs to begin with. The best way to start well with a prof is to be focussed. Try not to plead generally "what do I do?" Rather, ask



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if it is a good time and (if it is) concisely present what you are thinking or planning and ask for comments. Most profs will be flattered to ask them, will be opinionated, and will make time for you. You don't need to limit yourself to office hours; in fact it is often better not to since then you'll be competing for their attention with other students. In addition to everything else, ask them who else in your department you should talk with.

Try to talk with busy well-funded "research active" professors, who are more likely to know what is going on across Canada. Ask graduate students about the questions they wish they had asked when they were undergrads. As a general rule, don't approach the same person more than once a week unless they encourage you to. Finally, remember that you can always ask profs to write you letters of reference even if you don't know them well since they can chat with you and read your CV and transcript.

Does all this sound like a lot? It shouldn't take more than a couple of hours a week for a few months. Remember, your goal should be to do good science with a prof who you can get along with. The basic approach is to identify profs who are already doing good work and to talk with them.

Things to remember:

- If you get NSERC Postgraduate Scholarship (PGS) Master's or PGS Doctoral support, you can (and should) take it anywhere in Canada.
- Newly hired profs often have unallocated funds, fresh ideas, and not enough students.
- Peruse *Physics Today*, *Physics World*, and *Physics in Canada* now and then.
- Go to the Canadian Undergraduate Physics Conference as often as you can.

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