

# Applying for PhDs

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## General and personal advice

In general, there are a few steps to applying:

1. Choose a broad topic of interest;
2. Find a place you are interested in;
3. Research the place, including checking that your potential advisor/group is okay;
4. Apply.

First, one has to decide what one wants to do. However, bear in mind that it is already hard enough to find a good PhD position (as we will see), so allow yourself some flexibility with your topic of interest. Theoretical physics and related fields are all super fun, so you can't really make a bad choice!

Then, one needs to find a place one would like to go for a PhD. Generally, there are (at least) two websites where one can find open positions:

- Academic Jobs Online: <https://academicjobsonline.org/ajo/physics>. We would recommend going to the “physics” section instead of “theoretical physics” or some other subfield, since people usually just tag their ads in the most general way—using “physics”.

Once on the page, you will see plenty of positions listed, most fitted for postdoctoral applicants (hint: you will use this same site when you come to the postdoc application stage), but there are many PhD positions as well. If you don't want to stare infinitely through the pages, you can list the positions “by types” (located right below “Job listings” at the top). This sorting algorithm immediately changes the list for tenure tracks—ignore that (for now :) and choose “student programs” and “other”, which are a bit below “Job listings”. We know we're going into too much detail—but it helps save some time when trying to orient around on AJO.

You can then proceed to see which position you find desirable; for example, you click on some job ad and see that there are a bunch of requirements listed for the position, like a CV, a research

statement, and so on. Quoting directly from a some job ad: “*All applications should include a cover letter where you will present yourself briefly, a personal statement where your background and potential research interests are described, a CV, grade transcripts and 2 recommendation letters (sent directly by your recommenders)*”, and this is a pretty decent (and brief) description of what “cover letter” and “research statement” means.

- The second website we know about is “inspirehep.net” which is good for all sorts of things, including applications to places, but also for checking an author and his list of publications, upcoming conferences, and so on. For PhD applications, one goes to the “Jobs” section and sets the preferences that are shown right below the search bar. There are three parts to be checked: field of interest, rank, and region. So, as an example: field of interest: hep-th (theoretical high-energy physics), rank: PhD, region: Europe, and then you get a bunch of positions listed. We’re not sure how overlapping are ajo and inspirehep, but at least for postdoc applications, they were distinct enough for us to use both.
- Of course, it can always be the case that some universities don’t advertise on these websites. In that case, unfortunately, you have to go university-by-university. Nevertheless, all universities have a pretty decent interface, so you can easily find sections like “prospective students” or “jobs” or similar. For example, Cambridge <https://www.cam.ac.uk/> has just two options on undergraduate or graduate applications on their website + some news articles. Being British, they fancily call a PhD “postgraduate” but you get the point.
- Sometimes, the funding will come from the government and not the future supervisor. Some countries (Spain, Portugal, etc.) have scholarships that one has to apply for. One example is the “La Caixa” Fellowship, details of which can be found at <https://lacaixafoundation.org/en/doctoral-inphinit-fellowships-incoming-call>. Other countries (like France) have a different approach and in general, one should enroll in a master’s program to maximize the chance of getting into a PhD program later on; some French information can be found at <https://www.campusfrance.org/en/how-to-enrol-Doctorate-France>. As a general rule, our advice is to **google each country and their standard PhD application** (for above, we googled “France doctoral studies”);
- Yet another way of getting into a PhD program is to pass an exam: this is certainly true for most Italian universities (except for ICTP, which is an international institution) and perhaps is true for other countries as well. An example can be found at SISSA <https://www.sissa.it/tpp/phdsection/admission.php>. This way of getting a PhD position is good and bad at the same time: on one hand, one has to study for an exam that is not at all trivial, but on the other, an exam gives an equal opportunity to (almost<sup>1</sup>) all students that apply, regardless of their country of study and recommendation letters!
- Another website where it is possible to find EU funds is <https://euraxess.ec.europa.eu/jobs>. Here you can decide the researcher profile, the field, and the country.

However easy or hard it is to find the advert, it is important that you spend some time researching what kind of PhD you actually want to pursue. It is best to **start a couple of months prior to**

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<sup>1</sup>There is a mild pre-selection process, but students that come from Europe are generally allowed to take the exam.

**application deadlines**<sup>2</sup> and even though it sounds too early, it pays off, trust us. Writing letters and statements that are the required documentation takes time and revision. Moreover, you want your letters to be well-researched and well-written, which obviously cannot be done in one night.

Also, remember that you can always **ask for feedback** about these documents. It is a good idea to ask for input from your bachelor/master advisors. They know you and, after having read your cover letter, they can also prepare a more “tailored” recommendation letter (so maybe it can be a double benefit!). In general, it is good if you ask for this feedback a reasonable time before the deadline so that there will be no pressure on the person who is reading your documents, and you will have enough time to modify the documents based on the received feedback.

For example, if you are applying to work with a specific person (your future advisor—which is usually the case), then you want to know what they are working on, what they have developed so far, and so on. It is then recommendable that you put that knowledge into writing a cohesive research statement in which you combine the work of your potential advisor with your own ideas and interests. The same goes through if you are applying to work in a group instead of with one person in particular—in this case, you should research what the group does and “choose your favorite” person or persons to work with, explaining why their research is your life goal as well.

Also, crucially, **apply to many places at once**: a good number to aim for is anywhere between 10 and 100. Don’t wait for a reply from a university and only then apply for another: you will miss many great opportunities this way! So, apply for as many places as you can, all at the same time: it is easier for you to reject an offer than to not receive any. And just to emphasize, it is perfectly alright for you to reject an offer—for them, it is just another PhD student; for you, it’s a significant part of your life!

All of the things written above are some things you can (easily?) find on different websites as well. Now there are some things one should know before applying to any place, which is not emphasized enough on other platforms (as far as we’ve seen at least).

**It is important to know who your potential advisor is, not just physics-wise, but also personality-wise.** Too many good physicists have left the field solely because they were stuck with an advisor who either didn’t care about them or who actively made their lives miserable in one way or another. In order to minimize your chance of experiencing similar fates, you should do a “background check” on your advisor/group. One good thing about not having a lot of physicists in the world is that everyone knows everyone within their field (in positions of professorships at least). So, you can ask your current master’s or undergraduate advisors or other professors if they are familiar with the person you want to work with for the next 3-4 years. In the case they don’t know the said person, you can still email some of the previous PhD students that your potential advisor had. No sane person will condemn you for such an email and they will in general be glad to be of help. That said, one still needs to be careful about sending emails since you might just be unlucky and send an email to a particular student who had some personal beef with their advisor and is unable to answer without their personal bias interfering. General advice is then to send an email to at least two students (you can only minimize the bias-error, but not completely erase it). In any case, it would be best if you could talk to people that you already know and who are not likely to lead you in the wrong direction.

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<sup>2</sup>All of this goes through for your postdoc applications as well, in case you want to burn this document after getting accepted for a PhD.

Speaking of which, you are **highly encouraged to go and talk to PhD students in your vicinity**. Talking to your senior colleagues is extremely important since it gives you an insight into what to expect if/when you obtain a PhD position. It is, after all, 3+ years of your life that you will spend doing a particular kind of work which has many good sides, but obviously some bad ones as well. Generally, NOT going for a PhD is NOT a bad thing! As for everything in life, you have to figure out what works best for you<sup>3</sup>.

## Applying for the US and alike<sup>4</sup>

Some of the previous points mentioned cannot be applied in the case of a grad school application. The general rule in Europe is that students go through a master's degree somewhere and then they have a choice: either stay at the same institution or apply for a PhD somewhere else. In the US and alike, you apply for a *graduate school*. This means that you apply for a "physics program" where you take a bunch of classes during your first year (or two), you pass an admission test (some formality, similar to a master thesis defense, although they're not quite actual defenses), and then you continue in the same institution with your research. After you've passed the test, you pick one of the professors that are available in the physics group to be your advisor and you start what we'd call here "a PhD". One advantage of doing things this way is that you get familiar with professors during your years of taking classes, but also you get to learn more specifically what the group is working on at the moment and you can start publishing papers from very early on. That said, it is a very competitive place and there's a **lot** of people applying every year (~800 applicants for just a few places). Also, one generally has to pay quite a lot for each institution that they're applying to: there are fees for the English test (IELTS/TOEFL), fees for GRE tests (general knowledge of physics and English), fees for submitting the applications, etc. In the end, it usually amounts to a couple of hundred dollars per application or two. And if you don't get accepted, you don't get your money back. Sorry. However, you can maximize your chances of success by having really good/famous advisors/professors who know you and can write a letter of recommendation for you. This is by far the best way to get accepted into some US institution, although you shouldn't neglect your grades and GRE test scores. Crucially though, they **HAVE** to know you: if you ask a famous person to write a letter for you, but they have no clue who you are and how you think about physics, then this can do even more damage. One example website for necessary documentation is <https://www.physics.ucsb.edu/education/graduate>.

Our fellow postdoc shared his insight into the US system, and here's what he emphasizes:

- Graduate schools in the US are typically combined masters/PhD programs. Sometimes, incoming students with masters can be exempt from certain exams or required coursework.
- The GRE, including the Physics GRE, are often required for applications, and they are expensive. The importance of this exam will vary from institution to institution.
- Applications themselves also have fees.

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<sup>3</sup>Sorry for motherly-sounding advice, but mothers are generally right about things, so we're actually not sorry.

<sup>4</sup>This includes Canada, Australia, New Zealand, and probably a bunch of other countries, although some institutions employ the European system.

- Chances of being accepted may depend on the field of study and timing. Departments like every student to have an advisor, and availability may be limited. This also means that some students may not be able to work with their first choice for an advisor.
- Accepted students are often given an opportunity to visit the university before accepting an offer. This would be a good opportunity to find out more about the graduate school and its environment, including what it's like to live and work there, how involved the faculty are in advising their students, what the surrounding cities are like, how happy and satisfied the students are, and how well the students do after graduating.
- Some universities are closely connected to major cities, and others might be more isolated. Public transportation in the more isolated places may be limited, so a car might be needed for travel. This might include transportation to the nearest airport as well.
- Students might be required to teach in order to cover some of their expenses. This may also depend on the availability of funds from an advisor.
- Universities often provide housing for their graduate students. Some students may choose to find their own housing arrangements.

### Advice from professors

- In some countries (e.g. Spain) the potential advisor/group often do not have **funding** under their entire control to hire students but must do so through programs run by funding agencies with their own deadlines and procedures. In this case, it's useful to get information about these possibilities, their deadlines and procedures, by searching the web yourself or asking your mates and friends (also, ask PhD students/postdoc in the group). It's not a good idea to ask your would-be advisor for this information: they're too busy to be your personal information service so they'll likely ignore you.

So, besides asking to PhD students/postdocs in the group, you may also consider writing to the secretary of the institute/University to ask for this information.

- Here's some advice about the **style of the letter** you write to a potential advisor: Bear in mind that you're asking this person to consider having you around for 3+ years, so the first thing is that you must not scare them away from this idea by raising red flags.
  1. Be enthusiastic but not *overly* enthusiastic.  
Say that you're interested in their research lines, but you don't need to mention them much and please don't overdo it.
  2. Be open-minded about the lines you'd like to work on.  
Being at the level of a Master's degree you don't really know too much about specific research lines, so it would be a good idea to not propose to them specific projects that you have in mind since the idea is that you're going to work with them and not them with you: they don't need to.

### 3. Be polite without being sheepish.

Natural friendliness is fine but don't write to them like your buddies.

Be short and to the point—a very long rambling letter about your childhood and goals in life will not be read (you'll bore them.)

Write to them personally instead of a generic nameless letter: they may take longer to reply to you personally than it'll take you to type their name in the greetings of your serial email. But don't give the impression that your goal in life is to work with them and only them (you'll scare the shit out of them).

Don't ask too much of them, e.g. like any information that you may gather for yourself, unless they begin to open up and make positive noises. E.g. don't ask them to redirect you to other people in your group: that's your job.

If they don't reply to your letter, don't insist "I wrote to you and I'm still waiting for your reply" (I tell you, this guarantees a no, and by now you know why). If they don't get back, just forget it, they're not interested or simply can't, or they receive too many of these requests to reply to them all.

So, in the end, please consider the idea of asking for feedback before sending the "first contact" letter or all the other documents required for applications.

- **Interview.** Some PhD applications require a final interview. You can use the previous suggestions also for the interview. In particular, you can show that:
  - You know the details of your Master thesis project;
  - Enthusiasm/participation in the conversation (e.g., preparing in advance some possible questions for the interlocutor).

## Networking opportunities

- **Summer schools:** Unfortunately, there are not a lot of master's level summer schools for theoretical physics (with a notable exception of Petnica!). However, we would still keep an eye out for such schools since they are an excellent way to learn about some modern-day topics. They also serve the purpose of an oracle: plenty of lecturers means plenty of different experiences—you should use this opportunity to ask the lecturers whatever question you have, be it on the topic of the school, or some random physics question.
- **Conferences and workshops:** In general, these are not very useful for a master's level student, but sometimes, workshops have "training weeks" where they focus on providing the necessary background for the upcoming workshop. Examples can be found at GGI <https://www.ggi.infn.it/workshops.html> (here they also have really good PhD schools, but a bit too advanced usually for a master's student). In case you can attend such a workshop, definitely make use of such training weeks. They are usually meant for early PhD students, so the level shouldn't be too difficult. As for the schools, conferences, and workshops are another way of meeting your future advisor. Our favorite example is a friend who attended an (online) workshop and found his PhD advisor by chatting with him, He's now at UC Berkeley!

## Conclusion

Perhaps you noticed throughout this document that applying for a PhD is not at all a trivial task, and even if one does all the steps correctly, there is a crucial factor of luck that we cannot control. So, relax, do your application preparation on time, and try many places! Also, keep in mind that you already have an advantage with all of your experience from the Petnica school: we wrote this document for a reason after all. And of course, in case you have any questions, send an email to any of the Petnica school organizers!

We wish you the best of luck in your research career!