University of California, Irvine

Graduate School Handbook

2016-17 Academic Year

Paths to success for Department of Physics & Astronomy Undergraduates

Prof. Kevork N. Abazajian

electronic copy available at:
http://www.physics.uci.edu/~kevork/GraduateSchoolHandbook-UCIphysics.pdf (PDF)
http://www.physics.uci.edu/~kevork/GraduateSchoolHandbook-UCIphysics.epub (ePub)

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Introduction

This handbook is a recommended set of steps to help you achieve those goals and enter academia as a graduate student researcher at a top research university. One of the most essential components of being admitted to a graduate program is getting involved in research as an undergraduate, especially since you are at a leading research department. Several paths can lead to research opportunities: NSF's Research Experiences for Undergraduates (REU) programs, which are national programs, as well as local research opportunities via UCI's Undergraduate Research Opportunities Program (UROP) and Summer Undergraduate Research Program (SURP). Or, simply talk to a UCI professor who's research you find of interest!

A few comments regarding the references and language: the handbook refers to your *mentors*. Mentors include those officially assigned by the UC Irvine Department of Physics & Astronomy, but also any other faculty or research staff mentors that are advisors in academic or research settings. For example, a mentor could include a postdoctoral research scientist or faculty member you closely worked with over a summer program, or any faculty member or scientist that you have received substantial guidance from beyond course-related advice.

The handbook also refers to academic years referred to as "senior year" and "junior year." Certainly, many students have are not on a traditional four year track, and these labels may not apply accurately with how many credit hours you have or what a registrar at your institution would label you. The senior and junior year designations are meant to reflect the academic year you will be applying to PhD program graduate school and the academic year prior to that, respectively.

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Timeline for Graduate School Applications

Dates in 2016-2017

Junior Year

Primarily: *focus on studies for courses*

Research REU/Summer research programs	Fall 2016
Apply for REU Programs	January - March 2017
GRE Subject Registration Deadline	March 3, 2017
GRE Subject Test Date	April 8, 2017

Summer before Senior Year

Write Draft Graduate Essay	June-August
Iterate with mentor(s) on your essay	August-September
CSU Long Beach GRE Bootcamp	Late August (2016-17)

Senior Year

NSF GRFP:

Iterate draft essays with mentor(s) & undergraduate advisor	September - October
NSF GRFP Deadline	October 28, 2016

October GRE Subject Registration Deadline	September 23, 2016
October GRE Subject Test Date	October 29, 2016

Graduate Application Deadlines	December to January
Graduate Selection Deadline	April 15, 2017

Essential Components of the Graduate School Application

The graduate application typically has three portions that are roughly equally weighted by an admissions committee. In order of importance they are:

1. *Undergraduate academic record* — This includes the overall academic GPA, the GPA in physics & astronomy courses, and often grades in specific physics and astronomy courses in particular. Physics departments typically weigh the "big four" junior and senior course grades heavily: classical mechanics, electricity & magnetism, quantum mechanics and statistical mechanics. Astronomy and astronomy-represented physics departments will look at performance in junior and senior astronomy courses as well. This record can include your performance on the physics subject GRE.

2. *Letters of recommendation* — Often the most insight into who you are as a scholar and individual comes from well-crafted and detailed letters from your mentors and instructors. Building substantial relationships with a handful of faculty and choosing among them of whom to be your letter writers are therefore a crucial portion of your graduate application.

3. *Statement(s) of purpose* — The graduate essay or statement of purpose is often the most revealing portion of the graduate application as it is *you talking about you* and why you are on the path that you are. There is sometimes an additional personal history statement, personal statement or diversity activity statement that is requested.

That these components are approximately equal means exactly that: they are *approximately* equal. Some departments weigh #1, your academic record higher than the others, with 50% or more weight, and the other portions less so. Some departments do not care about #3, the statement, at all. Most, however use the statement as significant element. The fact that four years of academic work is weighed approximately equally with a few letters and a single statement/essay is

could be viewed as simply unfair. However, the academic record is summarized as a few numbers (or several grades), and the letters and statement can have much more detailed information that gives insight on *who you are as a scholar* and *your potential to succeed*. They are therefore typically weighed heavily in admissions decisions as well.

The graduate application and admission process is not standardized across all institutions nor is it necessarily consistent from year to year at a given department. This guidance is a rough picture of the process, and not intended to be absolutely accurate.

Choosing where to Apply

Your goal should not be to get into the highest ranked department on some national listing. It should be "a good fit." There are many criteria that need to be considered to find that best fit, including research opportunities, facilities, course offerings and requirements, financial offer (once accepted), geographic location, general climate of the department and student morale, and other work/life balance issues.

Choose a program with certainly more than one faculty or research topic in which you are interested.

Your interests and research topic choice given in your application is not a commitment, and ~50% of the time students work on different topics than their initial interests.

You should contact faculty at programs in which you are interested prior to applying. You should do this for at least for 2 or 3 graduate programs you in which you are interested. Email is an appropriate form of contact. You should personalize the email with the title and name of the professor, and give some context and detail to your contacting them. If you have worked with a professor that knows them, *mention that*. Describe your interest in specific aspects or general topics of their research. If that specificity is not in the email, it will likely be ignored. This gives the department more information about you beyond the application process, and could help in the admission selection process.

Your Academic Record

Your academic record includes the overall academic GPA, your GPA in physics & astronomy courses, and often grades in specific physics and astronomy courses in particular. Physics departments typically weigh the "big four" junior and senior course grades heavily: classical mechanics, electricity & magnetism, quantum mechanics and statistical mechanics. Astronomy and astronomy-represented physics departments will look at performance in junior and senior astronomy courses as well. This record can include your performance on the physics subject GRE, and less likely, the general GRE, though these are being de-emphasized as a matter of policy by the American Physical Society and American Astronomical Society as well as individual departments. However, the change is not coming very quickly, and these exams *are still overall important to a large majority of departments*.

If you do not do well (above 50th percentile, say), you are just confirming that your physics preparation is not very strong. *That does not mean that it is impossible to get in*; admissions committees *look for people who will succeed in their program*, and the Physics GRE not the best indicator of that. It only indicates physics preparation and test-taking skill. Study and practice the GRE style of physics problems. Test taking strategy certainly helps. You are given only 170 minutes to do 100 problems, so do the easy ones first and do not let yourself get stuck on a problem. Remember, you do not have to answer every one! Seek out resources to help you (many are free on the internet). Form a study group. There is an annual GRE bootcamp run at CSU Long Beach. Attend it!

The Physics GRE is very competitive: students who got *A*'s in their physics courses can end up in the 10th percentile of Physics GRE takers. The general GRE is less competitive. PhD candidates often are above 50th percentile on the verbal and above 80th percentile on quantitative without much study. Again, low scores do not automatically disqualify you, but they point to a weakness that must be overcome with some other strength. If you feel that your GRE scores do not reflect your ability, then take the exam(s) again.

Selecting your Letter Writers

Strong letters are potentially the most important part of your application. Often the most insight into who you are as a scholar and individual comes from well-crafted and detailed letters from your mentors and instructors. Building substantial relationships with a handful of faculty and choosing among them of whom to be your letter writers are therefore a crucial portion of your graduate application. Since undergraduate research is increasingly important for graduate admission, there should be little to no letter writers who know you in your academic work relative to those that know your research activities and accomplishments.

Letters from your classroom teachers are not necessarily very effective; they confirm that you got an *A* in their class, that you are diligent, etc., but there is little hint of the potential for research. If there was something substantial you did that went beyond the classroom activities in the class, then it may be appropriate to have an instructor write the letter. Examples of such activities are: a research project that started from material in the classroom, pedagogical material that you created for the class as a result of being in it, or becoming a peer instructor or a tutor after the completion of the course because you excelled in it.

In general, you need letters from people who have mentored you in real research projects, affirming that you have real-world problem-solving ability, creativity, information-seeking skills, motivation beyond grades, etc. Therefore, you need to start doing these kinds of projects, preferably before your junior year so you have time to get to know multiple people in this way. So, unless a very specific impact you had in an academic course can be communicated in an instructor's letter, a professor that you had done research with or knows your research is preferred.

The Graduate School Essay

Personal Statement vs. Statement of Purpose

Nearly all graduate programs require an essay describing your intentions, experience and plan for graduate student and future career. Most often this takes the form of a **Statement of Purpose** describes your "brain," the scientist you have become, will continue to grow to be, as well as your scientific approach and how you will enrich the scientific world.

Some programs require a second essay that is a **Personal Statement** or **Diversity Statement**. This essay is more like the personal statement for undergraduate admissions, and is about your personal history and how you will enrich the community you are wanting to join. This often includes how you would contribute to the diversity of that community and is often a required component of any graduate fellowships based on diversity. It should *never* be omitted, even if it is optional.

Statement of Purpose: Becoming a Scientist

Do not take this as being flippant, but your Statement of Purpose should ideally read as an adventure novel. It should describe how you got around to discovering and acting on your goals to become a researcher. In short, here: **your research is your purpose.** You want to focus on your path to achieving your goal as a research scientist, from entering an undergraduate program to now. You do not want to include information or motivations from childhood, primary or secondary (high) schools.

Who reads it? Your future peers!

Each department has its own review process, and it is controlled internally within the departments (in U.S. programs). Who reads your Statement of Purpose is faculty in the department to which you are applying. This is the audience to which you are writing, so do not be afraid to get technical in short order. It is also who you are trying to convince that you are determined aimed for success. When you

become a successful graduate student and get a PhD, these readers will become your peers.

Drafts & Proofreaders: Revise, Revise, Revise

Since the graduate essay (Statement of Purpose) is approximately 1/3rd of your application, about on par with four years of undergraduate classwork, it should not be taken lightly nor left to the last minute to draft. The key to an impactful and successful graduate essay is drafting it and moving it toward a perfect statement. The perfect statement does not exist, but with sufficient time and effort your statement can get pretty close.

We have put in place a timeline for getting input from your peers on your statement. This is useful as they will often see things about you or your research that you may have missed, things that a more senior mentor could miss. It also allows for peers to see what is successful in the statements that they are reviewing and can improve their own statements. One way of saying this is: the stronger they are, the stronger you are.

The overall timeline for drafting a statement is months, as we have set it out. This length of time is essential to let the statement "cook" as well as be improved as much as practicable.

Be respectful to your peers and faculty mentors: please, please, do not present faculty with very messy and highly incomplete drafts. Present a package that reflects you: The Professional.

Writing Strategies

You must think of yourself as a scientist: astronomer or physicist (in training). Every paragraph should somehow be related to your research area, interest, experience, and future. Distinguishing yourself with the essay. Trust yourself in writing the draft. It is a place and time to celebrate *you* and who *you* have become! Celebrate your work. This is the fun part. This is not the place to be modest. (You should of course avoid conceit or boastful comparison, e.g., "I am smarter/know

more/a better astronomer than all my peers."), but do not be afraid to "toot your own horn." Tell them of your accomplishments!

Being at UC Irvine Physics & Astronomy is one thing that has enriched your experience as an undergraduate (*hopefully*!). Write in your statement about:

- Being selected for competitive program
- Mentoring you received and gave
- The network of other students
- Any other things you benefited from UC Irvine Physics & Astronomy

Include the adventure that got you to want to do research. What is the wow factor that got you into physics or astronomy? Did a certain book or article inspire you?

Finally, read specific faculty's research in the department you are applying to and tie into it. Name the faculty you are most interested in working with, why their work is interesting to you, and what skills you bring to the table. Contact those faculty before you apply to build a relationship. A single paragraph tailored to each program you are applying to will personalize the essay and make it clear you are interested in their program and you have done your homework!

Mention a few fields/areas that you are interested in. You may not have already contacted these faculty necessarily. Try to be coherent in these fields: e.g., it can dangerous to say you are interested in astronomy or condensed matter theory. (It is not necessarily dangerous if both topics are well motivated in the text.)

Presenting a plan mismatched to the institution would be a significant mistake. One example is saying you want to do exoplanets at a department that has no exoplanet observers or theorists on the faculty. Even if they think exoplanets are is a great future field (and they may not, since they have no faculty in that topic), they have no one to mentor you, so that would be a large negative factor in your application. Also, is your plan practical? Some students are drawn to very speculative topics that it would be a negative detractor to your application. Talk to your faculty mentors to try to figure out what is speculative and what is practicable.

Key elements:

- What is the purpose of your graduate study?
- Any specialized areas of interest? Who did you work with, what did you do: internships, projects, employment, research and publications?
- What skills do you have: using, testing, designing or researching equipment? Be sure to include relevant coding and software skills.
- What are your future goals?
- Tailor it to the department to which you are applying. What makes you uniquely suited for this particular department, this specific institution?

Do not expect your first statement draft to be perfect. It will not. Keep writing, put it away for a few days, and edit later. Be forgiving to yourself, and free write. Write as if you are writing to a friend or parent (with knowledge of physics/astronomy).

To enhance the writing style of your statement, you may think of metaphors and themes to have images that flow throughout your statement, e.g., your steps to success… astronomical interests… themes in your research or ideas… any linked images. These are simply to enhance the statement to make it a more interesting and structured statement to read. That being said, these elements are not essential to a successful statement.

Elements of your personal information that are important to who you are and how you got to where you are are very important and should be included in the statement. However, personal information should not take up much of the Statement of Purpose. If there is a separate Personal Statement, more should be highlighted there.

Avoid elements of physics or astronomy statements that often start or include: "I've wondered about the night sky since I was *N* years old…" This should be made be more specific, scientific, professional. Avoid the *Yawn Effect*: "I love science. I love to study it, to breath it, to be it. Science is the foundation for all that we are. I have worked long hours pursuing my goal to become a Ph.D." Do not tell us you are

passionate and a hard worker, show me *how* you are passionate and *what you did* because of your passion.

Strategy for research portion of the Statement: Summarize Conference Poster Abstracts.[1]

- One paragraph per abstract
- Explain why your work is important: set the context to preempt the question "So what?"
- Describe the objective(s) of your work. What are you adding to current knowledge?
- Briefly explain the methods. This should not be a major focus of your abstract, but should describe on what topic(s) you specifically worked.
- Succinctly state results, conclusions, and recommendations. This is what most people want to know. Do not say "We present the results of our study and recommendations for action" - tell them what you found and recommend!

Follow the rules!

- Do not exceed the word limit.
- Single space is fine.
- 2 pages should be your target length.

Importantly, do not compare the content of your Statement of Purpose with friends applying to social sciences, humanities, law, medicine and health related programs. They have their own criteria for selection in those fields.

Diversity

Diversity comes in many forms: being a member of an underrepresented minority or gender group, coming from a low income background or being a first-generation college student, being a veteran, or any life experience not common to most college students. You should describe how your unique background informs your

[1] http://www.ncsu.edu/project/posters/EffectiveAbstract.html

perspective or goals in physics, and allows you to being new insight into the research you want to pursue.

Many graduate schools offer an array of scholarships for applicants from underrepresented minority groups. Graduate school essays are used to select and evaluate candidates for these scholarships. The scholarships can be multi-year full tuition & stipend or simply a one-time stipend. See a university's graduate division's website for a listing of the scholarship. Write about your contribution to diversity in your Personal History Statement or Diversity Statement of the graduate application, if there is one. *If there is no Personal Statement or Diversity Statement, then include a paragraph about your contribution to diversity and diversity activity in your Statement of Purpose.*

If appropriate, briefly explain what obstacles you have had to overcome and how that shapes what you aspire to do in your future career. This has been found to be a an accurate measure of future success, dubbed *grit*.

Describe any contributions to increasing diversity in the Personal History Statement or Diversity Statement. Discuss specific things you may have done (mentoring, tutoring, Physics or Astronomy Club president, etc.) that have acted to broaden the participation of women, minorities or other underrepresented groups. You could also discuss what you would do at the institution you are applying to improve equity and inclusion there; for example, start a graduate women in physics group or lead outreach events. Be sure to read up on what programs already exist at that institution.

Extenuating Circumstances

"Extenuating circumstances that may have resulted in less than ideal academic credentials for graduate school." — Dr. Liza Cariaga-Lo, Assistant Dean, Yale Graduate School of Arts and Sciences

Keep this section brief: such circumstances must be addressed, but a few sentences at most.

The faculty reading your application will look at the details of your transcript beyond the GPA. They will notice any lower fluctuations in your grades. Describe any problems or inconsistencies in your records or scores, such as a bad semester. Explain in a positive manner. Since this is a rebuttal argument, it should be followed by a positive statement of your abilities. Always point out upward fluctuations in your grades. In some instances, it may be more appropriate to discuss this outside of the statement of purpose.

Describe any special conditions that are not revealed elsewhere in the application, such as a significant (35 hour per week) workload outside of school. This, too, should be followed with a positive statement about yourself and your future.

Frame the negative as a positive, building experience. What did you learn from this experience? Make what is negative positive. Try to write a **strong** statement instead of a **weak** statement about the extenuating circumstances. Avoid "excuse" statements such as: "I had to work two jobs to support my family because my father was injured. My grades suffered." (Someone always has a more painful story.) This is better, but still not perfect: "I maintained a B+ average while working in Dr. Sprout's botany laboratory despite having to work forty hours a week as a waitress to support my family." You should "take ownership" of this circumstance. Instead, tell the story of the extenuating circumstance and how your perseverance or motivations overcame that.

Style and Writing Guidelines

Use good grammar. Avoid the potentially dreaded prepositional phrase and passive voice, for example:

- Avoid: Why was the road crossed by the chicken?
- The metropolis has been scorched by the dragon's fiery breath.
  becomes better as
  The dragon scorched the metropolis with his fiery breath.
- When her house was invaded by suitors, Penelope had to think of ways to delay her remarriage.
  becomes better as

After suitors invaded her house, Penelope had to think of ways to delay her remarriage.

Do not over use "I": we already know it is your Statement of Purpose.

Avoid platitudes & clichés: "I want to cure cancer." "Knowledge is power."

Avoid quotes & passages. Social sciences and humanities applicants overuse this strategy (i.e., passages from Shakespeare and the Bible).

Avoid contractions prevalent in informal writing: don't, can't, won't

Avoid colloquialisms and email/social media speak: Like, you know… LOL. WTF. ROTFL.

Do not assume knowledge: of (all things), particularly *acronyms.* Always spell out the first reference, as in University of California, Los Angeles (UCLA), e.g., SDSS, NRAO, NYU, NB, CSU, FBI, NASA, DOD, NSF, NIH.

If you have writers block: Pretend you are writing about a friend. Email your Statement of Purpose to a friend. Ask a friend to give you an artificial time limit.

Use **Auditory Assistance**: READ OUT LOUD. Start with your last sentence then proceed to the beginning of your Statement of Purpose. You will often hear your errors. Try not to stop while you are reading, jot down notes, and make corrections later. Be patient with this: it is difficult, but useful tool.

Print, Edit, Recycle, Repeat: print out your essay. Double space. Edit your Statement of Purpose with pen in hand.

Helpful Websites

UCI Undergraduate Research:
Undergraduate Research Opportunities Program (UROP):
http://www.urop.uci.edu/
Summer Undergraduate Research Program (SURP):
http://www.urop.uci.edu/SURP.html

Continuing the Journey
http://www.ucop.edu/journey

UCLA Career Center
http://career.ucla.edu

UCI Career Center
http://www.career.uci.edu/students/applying-preparing.html

UC Berkeley Career Center
http://career.berkeley.edu

UC Davis Career Center
http://icc.ucdavis.edu/

General Grad School Information
http://www.gradschools.com

Interactive Grad School Information
http://www.phds.org

Writing a Winning NSF Graduate Student Research Program Application

What is the NSF GRFP?

It is the National Science Foundation (NSF) Graduate Research Fellowship (GRFP) Program. The NSF GRFP supports promising students with a three-year fully-funded fellowship at the graduate program of your choice, given your admittance to it. There is much information on the GRFP website NSFGRFP.org.

From NSF: "The intent of the fellowship award is both to recruit diverse cohorts to go to graduate school and to retain talented graduate students in the early stages of their graduate education."

From NSFGRFP.org:

"The NSF Graduate Research Fellowship Program (GRFP) helps ensure the vitality of the human resource base of science and engineering in the United States and reinforces its diversity. The program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees at accredited United States institutions.

"As the oldest graduate fellowship of its kind, the GRFP has a long history of selecting recipients who achieve high levels of success in their future academic and professional careers. The reputation of the GRFP follows recipients and often helps them become life-long leaders that contribute significantly to both scientific innovation and teaching. Past fellows include numerous Nobel Prize winners, U.S. Secretary of Energy, Steven Chu, Google founder, Sergey Brin and *Freakonomics* co-author, Steven Levitt.

"Fellows share in the prestige and opportunities that become available when they are selected. Fellows benefit from a three-year annual stipend of $34,000 along with a $12,000 cost of education allowance for tuition and fees (paid to the institution) [note the graduate school routinely covers the remainder], opportunities

for international research and professional development, and the freedom to conduct their own research at any accredited U.S. institution of graduate education they choose.

"NSF Fellows are anticipated to become knowledge experts who can contribute significantly to research, teaching, and innovations in science and engineering. These individuals are crucial to maintaining and advancing the nation's technological infrastructure and national security as well as contributing to the economic well-being of society at large.

"So that the nation can build fully upon the strength and creativity of a diverse society, the Foundation welcomes applications from all qualified individuals. Women, under-represented minorities and people with disabilities are encouraged to apply.

"**The fellowship is competitive, and those planning to apply should devote a sincere effort to their application**."

Key points:

- Since the deadline is before graduate application deadlines, the GRFP can be moved to a different university graduate program than you designate.
- It is open to students that will enter graduate school in Fall of 2017 *or have less than 12 months of graduate school completed at that time*. (See "New eligibility requirements starting in 2016" below.) Graduating seniors effectively get a free chance to apply, and therefore should do so. The new eligibility limitations make it not be recommended for our masters students, but to be applied when you are in your PhD granting institution.

Application Details

There are two written portions of the application:

1. A Personal, Relevant Background and Future Goals Statement is three pages.
2. The Graduate Research Plan Statement is a maximum two pages. These can be created from your current graduate essay. The page limits include all

references, citations, charts, figures, images, and lists of publications and presentations.

Applicants must certify that the two Statements (Personal, Relevant Background and Future Goals Statement, and Graduate Research Plan Statement) in their application are their own original work. You must choose three Reference writers. Reference letters are due about a week past the GRFP deadline, and are submitted via NSF's FastLane.

Success in your GRFP Application

Here are some tips from experience with past winners of the NSF GRFP. UC Irvine's School of Physical Sciences has been very successful in getting NSF GRFPs, and that has led to some understanding of what helps increase success:

- The NSF GRFP is looking to support a promising individual, not just a research project.
- **Fully half of the scoring is for Broader Impacts**. Broader impacts are those that fall outside the scope of one's academic and research work. For example, working at a high-school or public outreach program with a public observatory qualifies, or even work through non-campus initiatives such as volunteering with primary or secondary schools. The student must demonstrate two categories of broader impacts: stuff they did in the past and stuff they are proposing to do now. Examples include tutoring, diversity and outreach experience, clubs, leadership roles in clubs, and the student must discuss what they did in that position rather than just mentioning/listing it. Former panelists state that the primary reason applicants fail to rise to the top is lack of attention to Broader Impacts. The NSF asks reference writers to address broader impacts in the letter of reference.
- All those getting NSF GRFPs I know of have had significant activities in broader impact already

New eligibility requirements starting in 2016

Effective as of the 2017 competition (Fall 2016 deadlines), NSF will limit graduate students to only one application to the GRFP, submitted either in the first year or in the second year of graduate school.

No change is made to the eligibility of undergraduates, of bachelor's degree holders without any graduate study, or of individuals who have had an interruption in graduate study of at least two consecutive years.

GRFP continues to identify and to inspire the diverse scientists and engineers of the future, and especially encourages women, members of underrepresented minority groups, persons with disabilities, and veterans to apply.

This change in eligibility should result in more individuals applying as undergraduate students who have not yet made the commitment to go to graduate school. This is a more diverse population than admitted graduate students.

How to Choose a Graduate School Once Admitted

Once you get an offer, you will probably be asked to respond by April 15, which is that agreed upon date by US universities as the earliest date a student can be required to decide. If you are asked to respond before then, complain strongly! Importantly, when you commit to a program by April 15, it is not a legally binding contract. Often, an institution will have you submit a form called a "Statement of Intent to Register" which is all that it is, an *intent* to register. It is permissible to change your mind after April 15. If you get a better offer after April 15, take it and ask for the first program to release you from your intent to register, which they always will, since no one wants an unwilling or unhappy student.

One of the best outcomes is to have choices among several excellent graduate programs. The selection process is similar to how you selected where to apply, but of course in a more specific way. The graduate school should be "the best fit." There are many criteria that need to be considered to find that best fit, including research opportunities, facilities, course offerings and requirements, financial offer (once accepted), geographic location, general climate of the department and student morale, and other work/life balance issues.

Between the admission and selection, is the best time to contact faculty and current graduate students at the graduate program to assess the research opportunities available and the climate of the program. This time can be a "barometer" of potential working relationships with faculty at those universities: if faculty are not very responsive when you have other options for graduate schools, they will very likely not be better once you commit to their program.

If you do not get any offers by April 15, talk to your undergraduate advisor(s) and mentors about options for masters programs that can help extend the bridge to a PhD program, or help find a PhD program with a slot open (the student acceptance rate can lower than expected at some programs in some years). There are also options from the American Physical Society's Bridge Program.