Masha's guide for applying to physics graduate school

Let's break down applying to physics grad school step by step! Note that this is not for fellowship applications, but just for regular applications to physics departments. Please contact Masha (Maria Okounkova) at **mokounkova@pasadena.edu** with any additional suggestions or questions. The **biggest piece of advice that I can give** is to email professors you would be interested in working with at the schools you would like to apply to. There is also information in this guide about choosing a school once you've heard back, and about the various exams required.

Note that the pipeline is Bachelors' straight to PhD, without the need for a masters' (if you leave the PhD program early, they will give you a masters'), and that **STEM PhD programs pay you** (at Caltech, we made around $32,000 / year when I was there 2014 - 2019, but stipends are around the $38,000 mark these days).

I. Applying to physics graduate school

1. Choosing schools

- Summer after junior year, start looking into which schools you want to apply to.
- Somewhere around 15 schools should be enough, but you may want to do more.
- Note that the "best schools" for you research-wise will be the ones that have the best research *in the field that you're interested in,* and not based on overall name recognition. This is unlike applying to undergrad, where you may have selected from a global list of "top schools".
- For each school, look through the research on the physics website and pick out at least 2 faculty members you would like to work with.
    - More than one professor per school is optimal so that you have the option of switching advisors if the fit isn't good.
    - Keep in mind that faculty members in certain positions, such as "research professor" or "research associate" might not formally be able to advise students.
    - Note that a lot of info may be out of date (for example, profs may have gone emeritus, or have stopped doing research in a given field). Sometimes these physics department websites are made when a faculty member joins the department and then never updated again. To check their present activity, look up their recent papers on arXiv.
    - Ask the people around you (faculty members, research advisors, etc) for any suggestions.
    - As you read papers, keep track of the authors of the ones that interest you - these may be good people to work with!

Keep track of all of this in a Google sheet! With a column format like:

School name	Research area	Potential advisors	Rec. letter due date	Link to rec letter page (or say explicitly if they'll email the letter writers)

2. Assembling a CV

At the same time as you assemble your list of schools, you should start assembling a Curriculum Vitae (CV). You'll need this when applying to some grad schools, but more importantly, you can send this when contacting faculty members you would like to work with, as well as giving your rec letter writers more information about yourself.

Your CV will look different depending on what part of your academic career you're in. For a finishing undergrad, I suggest having the following sections:

Contact information: You name, email, website (if you have one), github (if you want to share your projects)

Statement of purpose: Write a brief paragraph about yourself and your research interests. For example, "I am a rising senior at Princeton primarily interested in numerical relativity. Specifically, I am interested in using numerical relativity to test Einstein's theory of general relativity through gravitational wave observations."

Education: Include your school, graduating year, honors, any fellowships, and major and minors. You can also include your academic advisor and thesis title if you're doing a thesis.

Research Experience: For every research program you've done, put the name of the program, the institution, your advisor, and a couple of phrases about the project. If your project resulted in a publication or research talk, make sure to include that! For example, " LIGO REU at Caltech with Prof. Rana Adhikari, Summer 2012
Using machine learning methods to characterize gravitational wave detector noise"

Presentations and workshops: Include all of the talks or poster presentations you've given and all of the conferences and workshops you've attended, even if you didn't present there. At this stage you can also include internal presentations, such as "Research presentation to Caltech LIGO gravity group".

Publications: If you have papers, including papers where you're not the lead author, include them here. If you have a paper in preparation, put the title, the authors, and write "in prep, to be submitted to Physical Review D" (or whichever journal). If you're part of a big collaboration and have your name on a full-collaboration publication, you can also include that here!

Honors and awards: Any awards, fellowships, etc. that you got in undergrad. Explicitly write out what they were for - so instead of "Allen G. Shenstone Prize in Physics", write "Allen G. Shenstone Prize in Physics, Princeton University, for top juniors in physics, 2013".

Coursework: Include all of the relevant courses you have taken. Don't just write something like "PHY 207" - write out the title of the course and a little blurb if you need to, such as "Classical mechanics (Lagrangian and Hamiltonian)". Also highlight which courses you took at a graduate level.

Computational skills: Include all relevant programming experience you have. If you use python, you can write out what packages you're familiar with (such as numpy, matplotlib, and scipy). If you use a terminal, write bash or zshell and unix-based systems. If you know latex, write that. If you know

Mathematica, include this. Include anything that can be classified as using the computer to perform a calculation or develop a tool. Do not sell yourself short here - you don't need to be a seasoned expert in these programming languages to use them to do research, so include whatever you want.

Technical skills: If you know how to use machining equipment, clean rooms, optics, CAD programs, have certifications, etc, include all of those skills here.

Teaching and mentorship: If you have tutored, TA'd a class, TA'd a lab, graded for a class, include that here! Again, put a blurb for what the course is about, and not just something like "PHY 207".

Diversity and outreach: Include any outreach or diversity efforts you are involved in. If you gave a talk to high school students, for example, include that! If you're a member of a women in physics group, for example, include that!

Leadership experience: If you have a position in your physics club, for example, include this here. If you have a leadership position in another club (such as Columbia Frisbee Team, for example) include that here!

References: If you feel comfortable, you can include the contact info for your letter writers here.

3. Emailing professors at schools

The **biggest piece of advice that I can give** is to email professors you would be interested in working with at the schools you would like to apply to. Let them know you're interested in working with their group, ask if they're taking on students, and let them know that you're available to video chat if they would like. At the same time, it's very important to let them know about your background and skills. Having this connection is key, as when committees make decisions about which students they want to accept, you will already have a potential "fit".

So for example, if I pretended I was an undergrad at Princeton again and wanted to work with Saul Teukolsky at Caltech, I would write:

Subject: Inquiry about Caltech graduate research

Dear Professor Teukolsky,

Introduce yourself, say what school you're at / what your major is, and what you're interested in. Say that you're interested in the group and would like to know if there's an opening for students

My name is Maria Okounkova, I am a rising senior in the physics department at Princeton, and I hope to apply to Caltech for graduate school in physics. I'm passionate about binary black holes and

numerical relativity, and thus I'm very interested in the research in your group. I was thus wondering if you are taking on students in the fall.

Talk about your research experience, starting with research most relevant to the professor's field of research, but also include all of your other research towards the end!

My research experience includes a LIGO SURF REU working with Professor Rana Adhikari at Caltech on machine learning for detector noise characterization, a project on black holes in 5-dimensional AdS spacetimes with Prof. Frans Pretorius at Princeton, and a project on Markov Chain Monte Carlo parameter estimation with Post-Newtonian waveforms with Prof. Adam Burrows at Princeton. I have also done research in particle physics and dark matter detection.

Talk about your relevant coursework and technical skills

I have also taken a graduate general relativity course, courses on partial differential equations, and many courses in the computer science department, all of which I think will be relevant to numerical relativity research. My programming experience includes C, C++, Mathematica and python.

Conclude with an opening to chat and send more info

If you would like more information, I'm happy to video chat anytime - I would also be thrilled to learn more about your group! I can also send you a copy of my CV if you would like.

Thanks,

Best,

Masha

If you like the above format, try to copy it, but substitute in your own experience! Try not to be shy! Professors are explicitly paid to talk to students - this is literally their job.

4. Asking for letters of recommendation

At the same time as you email potential advisors, email people you would like to have as letter-writers.

Most schools need at least three letters (you can send more if you want), preferably from faculty members. In terms of people to pick:

- Any professor you've done research with that you think would write you a strong letter.
- If you primarily did research with a graduate student or postdoc mentor in a group led by a professor, ask the professor and your mentor to write a letter where your mentor

writes about your research, strengths, and skills, and the professor signs off on it. So the letter would be from the professor, saying something like “Masha was a research student in my group during Summer 2012. She primarily worked with graduate student X, who said that she was …”

- If you don’t have enough letters from research advisors, consider a professor of a course you’ve been in where you did well and actively participated (whether in class, or in office hours).
- If you don’t have enough letters from research advisors, consider asking a professor that you taught or graded for.

Some example emails:

Dear [Research advisor]:

I am applying to graduate schools for physics this year, and I was wondering if you would be willing to write a letter of recommendation for me. I think my research experience in your group would be an important aspect to highlight in my application package. If you would like to write a letter, I will send you a list of schools, links, and deadlines, as well as my updated CV. If you have any additional advice for grad schools, please let me know!

Thanks,

Best,

Masha

Dear [Research advisor] and [grad student or postdoc that I worked with]:

I am applying to graduate schools for physics this year, and I was wondering if you would be willing to write a letter of recommendation for me. I think my research experience in your group would be an important aspect to highlight in my application package. Since I primarily worked with [grad student or postdoc], I was wondering if [grad student or postdoc] could write about their experience working closely with me in a letter that’s formally from [Research advisor]. If you would like to write a letter, I will send you a list of schools, links, and deadlines, as well as my updated CV. If you have any additional advice for grad schools, please let me know!

Thanks,

Best,

Masha

Dear [Professor from a class]:

I am applying to graduate schools for physics this year, and I was wondering if you would be willing to write a letter of recommendation for me. I really enjoyed your electromagnetism course, and I think that in addition to my research experience, it would be important to highlight my coursework and theoretical skills in my application package. If you would like to write a letter, I will send you a list of schools, links, and deadlines, as well as my updated CV. If you have any additional advice for grad schools, please let me know!

Thanks,

Best,

Masha

Dear [Professor I TA'd or graded for]:

I am applying to graduate schools for physics this year, and I was wondering if you would be willing to write a letter of recommendation for me. I really enjoyed grading for your class, and I think that in addition to my research experience, it would be important to highlight my teaching skills in my application package . If you would like to write a letter, I will send you a list of schools, links, and deadlines, as well as my updated CV. If you have any additional advice for grad schools, please let me know!

Thanks,

Best,

Masha

- Email them as soon as possible, but not so soon that they would forget. Middle of September is good because they'll have settled into teaching, and won't have as many bureaucratic things going on.
- Once they agree, send them the google sheets link to your list of schools (as discussed above) with all of the links and deadlines, as well as the area of research you'd like to do at that school. Clearly state in the google sheet whether the school will email them asking for a letter, or whether they need to upload it to a website by a certain date.
- Use your google sheet to keep track of what letters have been submitted as well.
- Once they agree, send them your CV so they can get to know all aspects of your application.
- **Email them two weeks before each deadline** in order to remind them!

5. Writing a personal statement / statement of purpose

The last thing that you will need to apply is to write a personal statement / statement of purpose. The key here is to state what research you are interested in doing at the school and what professors you'd like to work with, and to write about your background in this field. At the same time, include any skills that you have picked up from working in other fields, courses, etc. So for example, pretending (and actually pretending here - this isn't my actual statement!) I'm applying to Caltech, we can write,

Maria Okounkova
Statement of purpose

Introduce yourself, say what you're interested in, and say what professor(s) you would like to work with at the given school

I am a rising senior in the physics department at Princeton, and my primary research interest is the theory of general relativity. I'm passionate about using the cosmos as a physics laboratory, particularly in the highly-dynamical regime. Specifically, I am interested in simulating binary black hole mergers using numerical relativity, and performing tests of general relativity using gravitational waves. Thus, I would be very interested in working with Prof. Saul Teukolsky at Caltech. I have a strong background in both physics and computer science, and thus I feel that I could suit this program.

Now we're going to write a paragraph for each of your research experiences. Even if you did research in a completely different field, you can stress the skills that you learned that will carry over. So for two examples, we can write

[Paragraph with directly relevant research:] For my junior paper in spring of 2013, I worked with Prof. Frans Pretorious at Princeton on numerical black hole initial data in 5-dimensional anti de-Sitter spacetimes. I wrote code in Mathematica and C to solve elliptic equations using finite difference and relaxation methods, and solved and analyzed the resulting initial data. This project was also my first introduction to general relativity, and thus I worked through Hartle's General Relativity book and read many papers, learning about black holes, spacetime curvature, boundary conditions, and a variety of other topics relevant to numerical relativity.

[Paragraph with other research but stressing how it can carry over:] In summer of 2013, I worked with Prof. Peter Meyers at Princeton on simulations for the Darkside-50 dark matter detector. I performed monte carlo ray tracing simulations in C for photons in the time projection chamber, and analyzed the results and compared the results to data from the detector using python. This work resulted in a publication, as well as a press-release. I quickly learned to use the GEANT4 and Root software, and I think that my ability to quickly pick up a framework could translate well to learning about the numerical relativity codes at Caltech. I learned about astroparticle physics, another way in which we can use the cosmos as a physics laboratory. I also gained a deep appreciation for all of the effort that goes into experimental physics (including working in a clean room and electronics), and while I plan to mostly work in theoretical physics, I look forward to interacting with experimental physicists in the LIGO and LISA projects in graduate school.

Once you have written about your research, write about your coursework and other relevant skills

In addition to research, I have also learned relevant theoretical skills through my coursework at Princeton. This spring, having finished my physics course requirements, I am taking a graduate General Relativity course with Prof. Frans Pretorious, as well as a graduate cosmology course with Profs. David Spergel and Paul Steinhardt. I have taken courses on relevant mathematical methods such as partial differential equations, and have taken a large number of computer science courses, including courses on algorithms and data structures, math methods for computer science, theory of computation, and programming systems, all of which will be helpful for research in numerical relativity.

Now you can write about your teaching experience

My overall goal is to remain in academia, and hopefully become a professor someday. To this end, I am also passionate about teaching at all levels. At Princeton, I have TA'd for the introductory computer science courses, including introduction to computer programming, algorithms and data structures, and programming systems. Thus, I hope to carry on TAing in graduate school.

Now write about diversity and outreach

As a woman in physics, I have faced unique challenges, and thus I hope to engage more women and minorities in physics through outreach programs in graduate school, including participating in science events in local schools and giving outreach talks.

Now to summarize

I would love to be part of the physics department at Caltech, and work with Prof. Saul Teukolsky on numerical relativity. I feel that I have the relevant research experience as well as the theoretical and computational skills for this undertaking.

All done! Now you just relax and wait. Remember to use your Google sheet to keep track of everything (and to email your letter writers 2 weeks before the deadlines to remind them!).

II. Once you've heard back...

Now let's talk about navigating graduate school offers once you've heard back from some places (congratulations - so happy for you!). In some cases, you may be asked to interview, or there will be a graduate school open house or visit where you'll have a chance to talk to professors and students.

It's important that you make the right choice for you, based on the way you weigh things in your life (fun, mental health, physical health, location, culture, friends, family, and partners, work, financial considerations, immigration considerations, etc), which is extremely personal and I can't help with. However, there are some concrete questions you can ask students and professors during visits to at least get a vibe for the 'work' aspect of life.

1. Interviewing, and talking to professors about science

Let's consider some questions you can ask professors about science, whether during an interview or a visit. You may have already met with the professor when applying, so this might be more casual, but I would still prepare for a formal-ish meeting.

- Look at some of the most recent papers they're on (there could have been some new ones that came out since you applied). Think about a few specific questions to ask about research.
    - An easy question to ask is to look at the 'future work' suggested in the paper, and ask about the status of that future work.
    - If it's a more theoretical paper, ask about potential experimental or observations applications. If it's a more experimental or observational paper, ask about any applications for theoretical physics.
- What are some additional projects you're currently working on?
- What do you think are some of the most exciting scientific questions in this field?
- How do you see this field evolving within the next decade? The next fifty years?

2. Graduate school visit - talking to professors

Now let's consider some additional questions you can ask professors you're interested in working with during visits. At this point, it's extremely important to assess the culture of the group, and seek out any potential red flags. This is your turn to evaluate the professor and whether they're a good fit *for you*

1. How many students have you had?
2. How often do you meet with students?
3. How often do you have group meetings?
4. How long have your students taken to graduate?
5. How many papers have your students written?
6. How many and which conferences do your students attend?
7. Have your students collaborated with scientists at other universities?
8. What have your students gone on to do?
9. What's the breakdown of your students who TA / RA / get fellowships?
10. What's your approach to the mental health of the people working in your group?
11. What's your approach to the physical health of the people working in your group?
12. What's your approach to the family considerations of people working in your group (if members have people in their care)?
13. What's your approach to advocating for diversity in academia?
14. How do you handle conflicts within the group?

3. Graduate school visit - talking to students

When you do your visits, make sure to talk to students who are working with the professors you're interested in working with. Here are some specific questions you can ask about research, in absolutely no particular order

1. How many hours a week do you usually spend on research?
2. Have you had enough time and support to prepare for qualifying exams?
3. Have you had enough time and support to do your coursework?
4. Have you been able to pursue the research topics you're interested in?
5. Have you been able to attend the conferences you're interested in?
6. Have you been able to apply to the fellowships you're interested in?
7. Have you been able to write the papers you've wanted?
8. Do you feel supported in pursuing the career path you're interested in?
9. Have been supported to graduate within your planned timeline?
10. Have you felt supported mental health-wise?
11. Have you felt supported physical health-wise?
12. Have you felt supported in terms of diversity considerations?
13. Have you felt supported in terms of family considerations (if they have people in their care, for example)?
14. Have you felt financially supported?
15. What was the learning curve like when joining this group?
16. Do you feel comfortable asking scientific questions to the professor?
17. Do you feel comfortable and supported during meetings with the professor?

18. Do you feel comfortable and supported during group meetings?
19. Do you feel like you get enough attention and help from the professor when you need it?
20. Do you feel like you get enough help from postdocs or other graduate students in the group when you need it?
21. What's the culture like in the broader scientific collaboration (if applicable)?
22. Have you collaborated with people outside of this university during graduate school?
23. Have there been any past issues in the group (In terms of harassment, conflict, etc)?

III. Exams for Physics Graduate School

1. The General GRE

The first required exam for graduate schools is the General GRE[1]. This test is very similar to the SAT. The test format is

- Analytical Writing ("Essays"): two 30 minute essays
- Verbal Reasoning ("Reading"): two 30 minute, 20 question sections
- Quantitative Reasoning ("Math"): two 30 minute, 20 question section
- Bonus Section: an unscored verbal or quantitative reasoning section where you're a guinea pig for testing out future test questions

Registration

The exam is available year-round at testing centers, and anytime if you take it at home. You can take it once every 21 days, up to 5 times in 12 months. The test costs $205 in the US, but there are financial aid fee reductions. The general registration page is here.

Preparing

Now let's talk about preparing. It's better to spend more time preparing for the Physics GRE if you need to take it than to spend time preparing for the General GRE, but it's still good to practice for a few weeks. The best thing to do in my opinion is to do practice tests, as detailed below.

Analytical Writing: This section has two 30-minute essays, one where you construct your own argument ("Analyze and Issue") about an issue, and one where you analyze an argument on an issue ("Analyze an Argument"). There's unfortunately not much you can do solo, but it's helpful to look at the Analyze an Issue Scoring Guide and the Analyze an Argument Scoring Guide to see what the graders will look for, and to look through Analyze and Issue Sample Responses and Analyze an Argument Sample Responses for examples.

Quantitative Reasoning: The math section has arithmetic, algebra (like "y = x^2"), geometry (like the area of a triangle) and data analysis (like finding the mean of a data set) questions. You should have enough mathematical preparation for this section, but it's good to familiarize yourself with the types of questions (on the bottom half of this page), this guide with sample problems, and with the on-screen calculator you have to use.

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[1] Note that I am not including the TOEFL in this guide as I do not have experience with the exam, but this may be required for international students.

Verbal Reasoning: Familiarize yourself with the types of questions here, and then do practice tests as detailed below

Practice Tests

The best way to prepare for the General GRE in my opinion is to take practice tests for the Quantitative Reasoning and Verbal Reasoning sections. Below are some practice test resources:

- Two free ETS practice tests here
- One free Princeton Review practice test here
- One free Kaplan test here
- $20 for Princeton Review book with seven tests here
- $17 for Princeton Review book with five tests here

2. The Physics GRE

The more important test to study for is the Physics GRE Subject Test. This is a 100 question, multiple choice test on undergraduate physics, for which you have 2 hours and 50 minutes and no calculator. Recently it's been shown that the physics GRE is not a predictor of future success and so various schools have been dropping the requirement - this is important to check for each individual school.

Registration

The rest is offered 3 times a year, once in the spring and twice in the fall. Test dates and locations are here. The test costs $150 but there is financial aid fee reduction.

Topics on the test

The test focuses mainly on undergraduate physics, with a breakdown (per the Physics GRE website) of

1. **CLASSICAL MECHANICS — 20%**
   (such as kinematics, Newton's laws, work and energy, oscillatory motion, rotational motion about a fixed axis, dynamics of systems of particles, central forces and celestial mechanics, three-dimensional particle dynamics, Lagrangian and Hamiltonian formalism, noninertial reference frames, elementary topics in fluid dynamics)
2. **ELECTROMAGNETISM — 18%**
   (such as electrostatics, currents and DC circuits, magnetic fields in free space, Lorentz force, induction, Maxwell's equations and their applications, electromagnetic waves, AC circuits, magnetic and electric fields in matter)
3. **OPTICS AND WAVE PHENOMENA — 9%**
   (such as wave properties, superposition, interference, diffraction, geometrical optics, polarization, Doppler effect)

4. **THERMODYNAMICS AND STATISTICAL MECHANICS — 10%**
   (such as the laws of thermodynamics, thermodynamic processes, equations of state, ideal gases, kinetic theory, ensembles, statistical concepts and calculation of thermodynamic quantities, thermal expansion and heat transfer)
5. **QUANTUM MECHANICS — 12%**
   (such as fundamental concepts, solutions of the Schrödinger equation (including square wells, harmonic oscillators, and hydrogenic atoms), spin, angular momentum, wave function symmetry, elementary perturbation theory)
6. **ATOMIC PHYSICS — 10%**
   (such as properties of electrons, Bohr model, energy quantization, atomic structure, atomic spectra, selection rules, black-body radiation, x-rays, atoms in electric and magnetic fields)
7. **SPECIAL RELATIVITY — 6%**
   (such as introductory concepts, time dilation, length contraction, simultaneity, energy and momentum, four-vectors and Lorentz transformation, velocity addition)
8. **LABORATORY METHODS — 6%**
   (such as data and error analysis, electronics, instrumentation, radiation detection, counting statistics, interaction of charged particles with matter, lasers and optical interferometers, dimensional analysis, fundamental applications of probability and statistics)
9. **SPECIALIZED TOPICS — 9%**
   Nuclear and Particle physics (e.g., nuclear properties, radioactive decay, fission and fusion, reactions, fundamental properties of elementary particles), Condensed Matter (e.g., crystal structure, x-ray diffraction, thermal properties, electron theory of metals, semiconductors, superconductors), Miscellaneous (e.g., astrophysics, mathematical methods, computer applications)

Studying

This test is very different from usual undergraduate physics exams, so you need to practice taking the physics GRE and study how to take the physics GRE. It's helpful to study with a group if you're comfortable, and I like the study timeline suggested by Alex Lang. Again, it's very helpful to take practice tests, so you can find:

- The official ETS practice book and test here
- The 1986 test here
- The 1992 test here
- The 1996 test here
- The 2001 test here
- The 2008 test here
- Ask around your physics department in case there are other practice tests around!

As you can see, there aren't that many practice tests around, so don't do them all at once - take time to carefully study a practice test after you have finished, making sure that you understand the material, before moving on to the next test.

3. Qualifying exams / Quals

The last physics exam you will usually take (besides exams for your classes in grad school) is the physics qualifying exam.

Format

This varies from physics program to physics program, but it's typically

- Taken at the end of the first year of graduate school
- Tests classical mechanics, electromagnetism, quantum mechanics, and statistical mechanics / thermodynamics
- One or two written exams, with 3 or so questions per subject (but the questions have multiple parts)
- Is pass / fail, and you usually have a certain number of attempts to take it (but again this varies from program to program)

For me, for example, I did my Physics PhD at Caltech, where at the end of my first year we had a six question classical + electromagnetism exam, and then a month later had a six question quantum mechanics + statistical mechanics / thermodynamics exam. I think we needed 50% on each in order to pass.

Preparing

Invest significant time to prepare for the qualifying exam. How much time you need will vary, but try to treat qual prep at least like an extra class that you have to take. Two things that are helpful are reviewing course materials and doing practice problems:

Course materials: Some institutions offer or require you to take courses in the qual exam subjects in your first year, so these can be helpful. Look through your textbooks on each of the subjects to re-familiarize yourself with the topics, and dive deeper into the topics as you figure out which ones are important from doing practice problems.

The Lim Books: These are compilations of actual physics qual problems from various universities (like Columbia, Princeton, MIT, UC Berkeley, SUNY, Wisconsin) with solutions. In fact, some universities take their qual problems directly from their books. There's

- Lim: Problems and Solutions on Mechanics
- Lim: Problems and Solutions on Electromagnetism
- Lim: Problems and Solutions on Quantum Mechanics
- Lim: Problems and Solutions on Thermodynamics

Ask around your department to see if they have copies of these books, or you can order them online. Note that some of these books have typos (I think the very first problem in the Electromagnetism book has a typo), so be careful.

The Red and Blue Books: Similar to the Lim Books, the “Red” and “Blue” physics problems books are compilations of actual physics qual problems. There’s

- The red book: A Guide to Physics Problems: Part 1: Mechanics, Relativity, and Electrodynamics
- The blue book: A Guide to Physics Problems: Part 2: Thermodynamics, Statistical Physics, and Quantum Mechanics