Qualifying Exam Policy
Stanford | Department of Physics

Purpose

The Qualifying Oral Exam (Qual) is an important part of the process of admission to candidacy. The exam seeks to give the student an opportunity to exhibit a broad knowledge of physics and an in-depth understanding of a particular area of physics that is not the one of her/his thesis research. The student should exhibit command of the material, an ability to extract the essential elements of a relatively recent development in physics, and the capacity to present this material to an audience of general professionals in a way that demonstrates his or her expertise.

The Qualifying Exam is distinct from the 4th Year Oral Presentation or the Oral Examination/Dissertation Defense, as those concentrate on the research topic the student has selected. Indeed, the Qualifying Exam encourages the student to have broad interests and appreciate the diversity of physics.

When

Admission to candidacy in the Physics department is normally done at or before the end of the student’s second year. It is therefore required that you schedule the exam for spring quarter of your second year. In fact, you should begin planning for the exam as soon as you have joined a research group and secured your Dissertation Research Advisor.

What to do

You should identify a research topic from a field of interest to you that is also close to the forefront of current research. However, the topic cannot be in the same broad area of research as your intended research work. To clarify this point you are required to identify your area of research as one of the four areas in the table below and select your topic from one of the remaining three.

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
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<tbody>
<tr>
<td>1) AMO</td>
<td>Quantum gases, precision measurements, laser physics, X-ray physics, high energy density, GW techniques, QI</td>
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<tr>
<td>2) Particle Physics</td>
<td>Collider physics, nuclear physics, neutrino physics, HEP theory, Direct DM detection</td>
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<tr>
<td>3) Condensed Matter Physics</td>
<td>Strongly correlated systems, device physics, low dimensional systems, CM theory, biophysics, other areas connected with life sciences</td>
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<tr>
<td>4) Astrophysics</td>
<td>Stellar formation, CMB, astrophysics with all wavelength and radiations (incl GW), cosmology, indirect DM searches.</td>
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You may consult with your Research Advisor for help with this process. Topics of broad importance and significance, involving multiple areas of physics are preferable to highly focused and specific niches. The topic should be represented by a key research article that the student will summarize to the examination committee (including all relevant physics background to put the content of the article in context.) To get an idea of what topics have been approved in the past, click here.

Updated: 8/1/18 AF
Approval of Topic and Constitution of the Committee

Once you identify your topic and choose a key research article, you will need to write a 1-page description of the subject and paper(s) to be discussed. This write-up should be in the style of the abstract of a paper, it should explain what is to be discussed and why this is of interest.

You will then need to fill out the online Oral Qualifying Exam Form. The form requires you to enter the name of your advisor and the topic of your thesis from the table above, along with the topic of your Qual (again, from the table). You will also be prompted to upload your research article and one-page description. Allison Freshwaters will then pass these materials to the Qual Exam Committee (QEC) for approval.

If your advisor is not part of the Physics, Applied Physics or SLAC departments, you should have a co-advisor in one of these departments (not just for the Qual!). In this case, the name of the co-advisor is also required on the form.

The examination committee for an oral exam will ordinarily consist of three faculty members. One of these will be chosen from the members of the Qual Exam Committee (QEC). The student can nominate up to two other faculty members when submitting his or her topic for approval, keeping in mind that the research advisor (or the co-advisor) cannot be one of the nominees. The QEC makes the final determination of the committee members. Ordinarily, all three oral exam committee members should be faculty within the Physics department, Applied Physics, or SLAC (PPA and Photon Science), but exceptions may occur for special reasons, as decided by the QEC.

Details of the Examination Format

One should expect the exam to last roughly 60 minutes (no more than 90 minutes); it should be scheduled by the candidate whose responsibility is to find a time when all of the committee members are available.

The exam will consist of a talk by the candidate to the committee (with no additional observers allowed), followed by a question and answer period. The candidate should plan to talk for 45 minutes, leaving at least 15 minutes for questions. Questions may also be interspersed throughout the presentation. The candidate should be prepared to answer questions about basic physics relevant to the motivation, background, and possible extensions of the research presented. It is important that the student be able to demonstrate a basic understanding at the undergraduate level of the underlying physics of the topic being presented. At the end of this period, the student will leave the examination room, where the exam committee (closed session) will determine whether the student has met the exam requirement.

What if I don’t pass?

In the event of failure, one is permitted to retake the examination a second time. The re-take of the exam should be scheduled no less than 3 months and no more than 6 months from the date of the first attempt. Students who need to retake the exam will need to go through the same approval procedure (of their topic and committee) through the QEC. In addition, students will need to complete a 5-7 page write up about the selected topic for their Qual committee members to review. The write up will need to be turned in to Allison Freshwaters no later than 2 weeks prior to the 2nd exam attempt. These written notes, together with the presentation, will provide the committee with a better understanding of how the candidate is contextualizing the material in question. The quality and understanding exhibited in the notes will be taken into account.
account by the committee in deciding whether the student passes the second exam.

If the student fails the Qualifying Exam on the second try, an ad hoc committee consisting of the student’s Research Advisor and the Chair of the Graduate Studies Committee will be convened to discuss further options with the student.

Qualifying Exam Timeline