Physics & Astronomy Grad Program and the Qualifier Process

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Outline

◆ The qualifier process
  ◆ Components of the qualifier
  ◆ Expectations
◆ Beyond the qualifier
◆ Annual committee meetings
◆ Dissertation and defense
Steps to Candidacy

- Take and pass the core courses
  - Placement exams
  - Challenge exams
- Find a mentor and prepare a topic
- Prepare the paper
- Give the oral presentation
- Pass the oral exam
Courses

◆ Physics option core courses
  ◆ Classical Mechanics (507), Stat Mech (611)
  ◆ E&M I & II (503, 504), Quantum I & II (501, 502)

◆ Astronomy option core courses - current class
  ◆ Classical Mechanics (507), Quantum I (501)
  ◆ E&M I & II (503, 504), Stars (541) or Galaxies (543)

◆ Pass with grade of B or better or pass challenge exams

Seminar in Physics, January 22, 2013
Research Topic

- Find an area of current research that interests you
- With aid of mentor explore in some depth
- Goal: demonstrate *readiness* to do research, not necessarily to *do* research
  - General understanding of field
  - Specific understanding of particular topic
  - Importance of topic and what research investigations are called for
  - Understand the underlying physics (and/or astronomy)
- A research project is not required for the qualifier
- The subject may or may not become your dissertation topic
- The mentor may or may not become your dissertation advisor
Research Topic

- High Energy Theory
  - Students without advanced preparation will probably not be ready
  - The HET group considers Quantum Field Theory courses as prerequisites
  - Students are advised to pick a non-HET topic for the qualifier
  - This will *not* preclude dissertation work in HET
  - Students should consult HET group for further advice
The mentor’s role is to guide you in a project by suggesting a particular subtopic, suggesting references and papers to read, or basic topics (the stuff in textbooks) to be studied more in depth.

The mentor should check on your progress and answer questions BUT he/she is not expected to be spending many hours a week trying to teach the material to you. You are expected to do most of the work on your own.

The mentor has no obligation to take you on as his/her PhD student if you pass, and you have no obligation to choose your mentor as your dissertation adviser.
The paper should be 10-12 pages in length (11 pt font, 4 lines per inch), e.g., Phys. Rev. style

The paper should consist of at least three parts

- Introduction: overview of the topic, general background, its importance, and the current problems
- A more detailed discussion of a particular subtopic and how it helps the field
- A final discussion on how to address the subtopic in order to advance the field. This might, but does not have to be, part of your dissertation

All appropriate references and citations included
The presentation should be a professional-style presentation (probably PowerPoint or similar) lasting no more than 20 minutes.

It should cover the elements of your paper in the same manner as you would present at a conference.

Should not get into low-level details (avoid lots of equations, details of experimental apparatus, etc.).

Should be clear to a non-specialist.
Oral Exam

- The oral exam will test your understanding of the topic and the essential physics behind it. You should be prepared to answer questions about anything discussed in your paper.
- Questioning may cover more basic topics and will be guided by the quality of responses to questioning. Poor answers may lead to questions about more basic material.
- For an experimental topic, you will be expected to have an understanding of how the detectors you discuss work. [Example: If you talk about a scanning tunneling microscope, you would be expected to understand quantum mechanical tunneling.]
What do we expect from you?

- Based on your area of interest, seek out a mentor and notify Valery Kiryukhin and Jolie Cizewski of the mentor’s name by May 1
  - The mentor will guide you in picking a particular topic, suggest reading materials, monitor your progress in learning the topic
- By Sept. 1, you should submit a 1 page paper to Valery Kiryukhin summarizing the topic you will be talking about
- Presentation/exams will be scheduled for November. You may ask for an earlier exam if you feel you are ready.
What if I don’t pass?

- You may be asked to repeat all or some of the exam. For example, you may be asked to repeat only the oral exam, without re-writing the paper or giving a new presentation.

- You will be given one chance to repeat the exam, which should be done before the end of the following semester.

- Even if you pass the exam, you cannot be advanced to candidacy until you have successfully gotten B’s in the core courses or passed the appropriate challenge exam.

- Even if you pass the exam, you may be advised to try another area of research and/or another advisor.
What happens when I pass?

- The fun begins!
- Choose adviser and have first committee meeting within one year after passing the exam
- Register for research credits once admitted to candidacy. Minimum 24 required, 72 total (course + research)
- Advanced course requirement - 5 in total
  - 2 outside of research (at most 1 outside of physics and astronomy)
- Goal: complete dissertation research in 3-4 years (6 total).
  - Remember - no extra credit for extra time spent in grad school!
- Optional - apply for M.S. degree
  - 30 course credits; can transfer grad courses from other universities
Path to the Ph.D.

- The fun continues!
- Annual committee meetings
  - Written and oral presentations
  - Make sure you are on track
- Preparing for beyond the dissertation
  - Consider external fellowships
  - Give talks and posters at professional conferences
  - Learn about wealth of careers - attend SIP every year, meet visitors, talk to advisors and colleagues outside of university research
- Stay in touch after graduate