The Qualifier Process

Ted Williams
Jerry Sellwood
Jianpeng Liu

Rutgers, The State University of New Jersey
Outline

- The qualifier process
- The components of the qualifier
- Expectations
- Panel discussion
Steps to Candidacy

- Take and pass the core courses
- 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
  ▼ 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
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 astronomy)
- A research project is not required for the qualifier
- The subject may or may not become your thesis
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 thesis work in HET
  - Students should consult HET group for further advice
Mentor

- 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 thesis adviser.
The paper should be 10-12 pages in length (11 pt font, 4 lines per inch)

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 a how to address the subtopic in order to advance the field. This might, but does not have to be, part of your thesis

- All appropriate references and citations included
**Presentation**

- The presentation should be a professional-style presentation (probably PowerPoint or the like) lasting no more than 25 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.
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 Jerry Sellwood 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 Jerry summarizing the topic you will be talking about
- Presentation/exams will be scheduled for November (possibly into early December). 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.
What happens when I pass?

- Your life becomes better!
- You must choose an adviser and have a first committee meeting within one year after passing the exam (extensions possible if you are making progress)
- You can register for research credits once admitted to candidacy. Minimum 24 required, 72 total (course + research)
- Try to complete thesis research in 4 years (6 total).

▼ Remember - no extra credit at the end of your life for extra time spent in grad school
Panel Discussion

Jianpeng Liu

Jerry Sellwood