Graduate School?

Where?
How? What are my chances?
or:

“Graduate Applications: What Are They Looking For?”

Michael Rijssenbeek, April 7, 2010
Grad School?

- **What is Physics:**
  - Physics is: the study of natural phenomena and effects, and extrapolations thereof, using models and mathematics as tools.
  - It is also thing of great beauty and wonder that we can (attempt to) grasp and understand things (at least partially), all the way from quarks to quasars...

- **The Physicist’s Approach:**
  - Take a open-minded, very broad look at a problem
  - Teach yourself the aspects you don’t know (enough) about
  - Analyze, break-down, model
  - Estimate, calculate, extrapolate, and cross-check
  - Creative, experience-based intuition for solution: “jump and backtrack”
  - Keep an open mind along the way: nothing is certain (not even that the solution will work), the detail is in the probability
• **The Attitude:**

  – Any task that is not in conflict with “the laws of physics” can be solved (but sometimes it takes a few lifetimes of work and/or an inordinate amount of funding),

  – or: Optimistic: everything can be made to work.

  – Question accepted “truths” (but “within reason”!), apply experimentation and calculations to establish new facts; keep always an eye out for holes in the reasoning and observations.

  – Prepare for perpetual learning!

  – Have Persistence and Passion, and: *enjoy!*
• **This Approach is valuable in most fields in Society:**
  
  – Accelerators, Acoustics, Archeology, Artwork verification, Arms Control, Army
  – Biology, Biophysics
  – Computer Science
  – Diagnostic imaging
  – Engineering, Environmental science
  – Forensic science, Fiber-optic links
  – Geology
  – Health sciences, Highway and Crowd modeling (highway department)
  – Imaging
  – J
  – K
  – Lasers
  – Medicine, Meteorology
  – Nanotechnology, NMRI
  – Optics
  – Patent office, Peace Corps, Politics/Policy, Power industry
  – Quantum electronics, Quantum optics, Quantum computing
  – Radiation therapy
  – Semiconductor industry, Sensors, Simulations, Standards, Stock Market
  – Teaching
  – Ultrasound
  – V
  – Weapons research, (technical) Writing
  – X-ray diagnostics
  – Yttrium-Barium-Copper-Oxygen research (High $T_c$ Superconductors)
  – Z
• **Other skills are often very important too:**

  – people skills; public speaking, writing skills
  – language skills, study-abroad experience, international service work
  – business administration, computing, economics, chemistry, ...

  – Remember: Rutherford’s dictum
    “In Science there is only Physics; all the rest is Stamp Collecting.”
    is only half true...

  – and if you ARE interested in stamp collecting, you can always do a MS in Physics or Astronomy ...
If you decide to go the Graduate School

Decide if you know what field you want to go into:

• If you know:
  – find the best programs in that field

• If you don’t know:
  – Look for the larger schools
  – They offer more choice and variety

Must be compatible with your chances of admission!
  – Apply to a range of schools around your competence level
Schools

• **Lists of Graduate Programs, consult:**

• **Consult a mentor in the department:**
  – Professor or postdoc in a field of Physics/Astronomy that you like
  – The (under)graduate directors
  – students whose judgment you trust
What are my Chances?

For comparison: look at our own Graduate site:
http://graduate.physics.sunysb.edu/faq/index.shtml

• **What is my GPA?**
  – Stony Brook: ~3.5 and higher

• **What are my Courses?**
  – Broad course spectrum
  – NO grades below B; preferably B+ and up
  – Advanced courses are a plus! In particular for Theory Applicants, where good math scores also count ...
What are my Chances?

• **What are my GRE scores?**
  – Typically not very important unless LOW
  – Low: Quantitative ~550; Verbal~400; Physics~650
  – Physics GRE: not always required; but if you take it, do well!

• **What is my RESEARCH experience?**
  – Research experience (REU, ...) is very good!
  – publication(s): even better
  – Beware of possible conflicts between a good GPA and a good research record:
    – do academic-year research only if you can make a serious and recognized contribution ...
What are my chances?

• *Prepare a strong personal statement:*  
  – READ UP ON THE DEPARTMENT YOU ARE APPLYING TO!
  – Discuss what you like about the field (or about physics in general)
  – Discuss your research experience in the field (and why this department)
  – Discuss your talents (and how they would profit the department)
  – Discuss your goals (and who you want to work with)
  – Explain bad grades, mishaps, etc.
  – Have someone else critique your statement …
What are my chances?

• **Select three good recommendation writers:**
  – Professors/researchers you have (closely) worked with ...
  – Professors in courses you did (very) well in: good grade and active class participation ...
  – and who know you WELL! (a tame, standard-form recommendation is no good)
  – Professors/researchers who are renown (in your field of study): only IF they will be writing a strong letter!

In summary: you want strong letters of support, not very long, but with relevant detail and where you are compared with the very best ...

• **Avoid:**
  – Family, job supervisors, TA supervisors, postdocs
  – Professors who do NOT know you well
  – Professors who do not seem interested in writing a letter ...

• **Follow up!**

In summary: you want strong letters of support, not very long, but with relevant detail and where they compare you with the very best ...
What are my chances?

**Finally: your own active interest will show if you:**

- Visit the department!
- Talk to the professors, AND to the students!
- Prepare well for the visit …

And remember:

- Stony Brook graduates are well regarded …