Group Project #1: Mini-Qs
Graduate Quantum I
Physics 6572

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Student-run oral examinations Friday September 14
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Groups Garth, BRAAP, APAX, and Undergrads have notable contributions to the Wiki, that you might be interested in. Five of the groups don't have pages yet ...

Let's get focused! Three steps for the next few days. (I'm guessing and encouraging you to meet this weekend to work on the problem set. You might set aside an hour running through exercise (G.2).)

(G.1) **Develop exam question** *I'd like each of you, on your own, to come up with some fact about the real world that you can explain using basic facts about quantum mechanics and dimensional analysis.* The density of matter (Avogadro's constant? Density of water?), the scale of chemical energies (how many calories in a cookie?), the height of mountains, time/energy scales for electronic transitions (sodium vapor lights), vibrational transitions, and rotational transitions, and the exponential suppression of quantum tunneling come to mind. I recommend questions involving mostly the fundamental constants, and answers that are expressed in terms of common quantities (Bohr radii, Rydbergs...) and dimensionless ratios (the fine structure constant, M_P/m_e, ...). Some of the answers may be off by factors of ten or more, but if it's off by much more than that perhaps you've missed a dimensionless ratio. *Prepare and practice a five-minute explanation as if you were asked this question in your mini-Q.*

(G.2) **Practice Qs in group.** *Pair up and try out your questions on at least two of your group members. Be prepared to offer them useful constants and small hints. Unlike Newton, they can use anything they know to answer the question. Give them fifteen minutes to come up with a sensible answer, but remember it may not be the one you came up with.* Between the practice Qs and discussion about how to improve the questions, this should take about an hour.

(G.3) **Best question for Friday.** *Each of you should give your prepared five-minute presentation to the group. If you're a big group (more than three), break up into subgroups of two or three 'special committees'. Each special committee should pick one question to ask when you give your mini-Qs on Friday.*

(G.4) **Sign up for times.** We'll figure out some kind of signup sheet, so we can schedule all the mini-Qs. We'll need more than one hour in total, so if you are free the hour before or after class-time, try to let us know. *More about this soon.*