Physics 5250

T. DeGrand – email thomas.degrand@colorado.edu My office is Gamow Tower F-319.

Lectures are in G-125 2:30 to 3:20 PM MWF. Office hours will be 1-1:30 and 3:30-4 (till the colloquium) on Wednesdays and 1-4 on Thursdays, plus whenever you can find me (not the hour before class, please). I respond pretty quickly to emails during the day, less quickly in evenings and on weekends.

I'll use the regular class web page

- `http://www-hep.colorado.edu/~degrand/p5250.html`

to get information out to you. I'll use Canvas as little as possible. "Secret" things will go there, if necessary. If we have to shut down again I'll do Zoom lectures at the regular class time and record them to the cloud. Let's hope for the best, though.

Grade:

- homework 250
- midterm 100
- final 150
- total 500 points

Homework will typically be given out on Wednesdays, due Friday of the next week. The questions will be posted on the class web page. The grader will probably be marking papers over the weekend and I will want to post solutions at some reasonable time after the Friday deadline, so keep to a schedule and negotiate with me if you feel you have to turn in something late. Homework solutions will be scanned onto the course web page.

The grader is Matteo Wilczak `Matteo.Wilczak@colorado.edu`

The midterm will be an hour and a half long exam some evening in mid October. The date will be arranged by mutual agreement. The final exam is scheduled for Monday, December 12, 130-4 PM.

My notes, in the guise of what is almost a textbook, are on the web page and are on Canvas. They will be updated as needed. Tell me about typos. The optional text is Sakurai and Napolitano, "Modern Quantum Mechanics." I will try to use Sakurai's notations and conventions. But don't expect me to follow any book closely. I can't do it. Books I regularly refer to (all have titles like "Quantum Mechanics") include

- Dirac – the classic place for reading about the foundations. Everyone should read the first 6 chapters at some point in his/her graduate career.
- Schiff – No path integrals, but almost everything else.

- Baym –I go to Schiff and Baym first when I have a question
- Landau and Lifshitz – another classic text. Kill two birds with one stone and read it in Russian.
- Feynman lectures, V.3 – I don't believe any Caltech sophomore who heard these lectures understood them, but if you are in graduate school you are old enough to try.
- Cohen-Tannoudji – some JILA people are said to like this book, but I think it is too verbose
- Shankar – this is an undergraduate text, but it is definitely not low level

There are many other books, probably equally good. For atomic phenomenology, find the old book by Herzberg. Undergraduate texts will probably be too simple for the material for this class but might be useful if you have to back up and take a running start at something. The first semester emphasizes "exactness" – the vocabulary of Hilbert space, the study of various iconic systems, a little wave mechanics, a lot of angular momentum. The second semester is mostly about approximations: time independent and time dependent perturbation theory, the Golden Rule, the interaction of radiation and matter, a bit of scattering theory.

Quantum mechanics is subtle, and you don't learn it by sitting in lecture and listening, or by just reading my notes or working the assigned problems. In my experience, students commonly don't spend enough time reading outside material. If you can, go to the library, check out several books, and read them in parallel. Try Wikipedia (but check everything there), look for other people's on line notes, look for out of print books. Tell me if you find sources you like. Then check all the derivations and make up your own sample problems. Argue with your colleagues. Take your time! All too soon, you will have to specialize, and the time you can use to learn new things will become severely compressed.

Finally, if you qualify for accommodations because of a disability, see me as soon as possible but before the second week of class.