PHYS 6574: APPLICATIONS OF QUANTUM MECHANICS - II

Schedule: TR 11:25 A.M. - 12:40 P.M. EST.

Location (in-person): Rockefeller Hall 230.
Synchronous online lectures available via zoom (Link available on canvas).

Instructor: Debanjan Chowdhury (debanjanchowdhury@cornell.edu)

Zoom "hang-backs": I will be available on zoom after each lecture until 1:00 P.M. EST for additional discussions.

Study room hours: To be determined

Office hours: By appointment (over email).

Prerequisites: An introductory graduate level quantum mechanics course (at the same level as PHYS 6572 at Cornell). Undergraduate students are welcome to register for the course, after discussing with the instructor.

Credits: 4

Course description: This is a graduate level course that will discuss an assortment of advanced topics in quantum mechanics. The aim of this course is to enable students to develop a conceptual understanding of various fundamental aspects of quantum mechanics and a variety of technical skills. A tentative course outline appears below (the list of topics might change based on student feedback and time constraints):

- Time dependent perturbation theory
- Scattering theory
- Quantization of the electromagnetic field
- Quantum statistics and many-particle quantum mechanics
- Quantum entanglement and other advanced topics

Course grade: The grade will be decided based on the homeworks (approx. 55 %), a final exam (approx. 40 %) and class participation (approx. 5 %).

Homeworks: In order to learn the material covered in the lectures, it is essential to work on the homework problems. I will also often assign homework problems that will walk you through topics that we will not cover in the lectures in detail. I encourage everyone to collaborate with their classmates on the homework problems, but the final submission should be their own work. The "study room" (organized on zoom) can help students get together and collaborate on the homework. Please list your collaborators on the homework. The homeworks will be judged partly based on the overall quality of the effort and thought

process. The homework with the lowest score will be dropped when determining the final course grade.

Useful books: The following books will be used as the main textbooks for this course:

- *Modern Quantum Mechanics* by J.J. Sakurai and J. Napolitano
- *Lectures on Quantum Mechanics* by S. Weinberg

In addition, there are a number of good books that discuss the topics covered in this course and might be useful as a resource. These include:

- *Quantum Mechanics: Fundamentals* by K. Gottfried and T.-M Yan
- *Principles of Quantum Mechanics* by R. Shankar
- *Quantum Mechanics - Nonrelativistic theory* by Landau & Lifshitz
- *Quantum Mechanics* by E. Merzbacher