Physics 162b: Quantum Mechanics II

Instructor: Prof. Matthew Headrick  
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Office: Abelson 310  
Office hours: Monday 4:00–5:30pm and by appointment. You are also welcome to knock on my door at any time, and I will meet with you if I can.

Time and place: Tuesday and Friday, 9:30–10:50am in Abelson 229.

Content: This course is a continuation of Physics 162a, covering more advanced methods and applications of quantum mechanics. Many of the mathematical methods we will study are also useful in other areas of physics. The course will cover the following specific topics: WKB approximation; time-dependent perturbation theory; emission and absorption of radiation; quantization of the radiation field; adiabatic theorem; scattering; path integrals; quantum non-locality, decoherence, and elementary quantum information theory and computation. For most of the material we will follow the assigned textbook, *Introduction to Quantum Mechanics* (second edition) by Griffiths. This will be supplemented by other sources, including parts of Shankar’s “Principles of Quantum Mechanics” (second edition).

Assignments: An assignment will be due each Tuesday, which will generally include a reading and a problem set. The problem set will include some relatively straightforward exercises based directly on the reading, as well as some harder problems based on the previous week’s material. You are encouraged to work together in solving the problems (or at least to check your solutions), but you must write the problem set up by yourself (no copying). Problem sets will be graded based on both the correctness of the physics and the quality of the presentation. Late problem sets (or portions thereof) will be given 50% credit if handed in within one week of the original due date.

You are also required to submit one question on the reading assignment each week on Latte. The question can be either about something you didn’t understand or about a possible extension or application of the material. (There will be a separate Latte forum for questions about the problem sets.) The reading question is due at the same time as the problem set (Tuesday at the start of class).

Exam: There will be a take-home final exam.

Grade: Your grade for the course will be calculated as follows: 10% on class participation (including submission of questions on the reading); 50% on problems sets; 40% on the final exam.