Quantum Mechanics 660, Spring 2024

Lectures: Tuesdays and Thursdays from 1:30pm to 2:45pm in PHYS331

Instructor: Martin Kruczenski, e-mail:markru@purdue.edu, Office: PHYS274.

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Textbook: "Modern Quantum Mechanics" by J.J.Sakurai.

Course Webpage: `http://web.ics.purdue.edu/~markru/`
(and brightspace)

Homework: Every other week (problems posted in webpage). The deadline is one week after the problems are given.

Exams: One midterm and one final exams. The dates are to be determined.

Final grading: Final grade is the average of the two exams. If **all** the homework problems were returned in time and were reasonably correct, the final grade will improve.

Note: Please take some time to look at the course website mentioned above and locate the information related to this course. Homework and other information will be posted there.

General Information

Information can be found in the websites,
Emergency preparedness and planning: (for actual emergency call 911)
`http://www.purdue.edu/emergency_preparedness/`
Information for physics graduate students:
`http://www.physics.purdue.edu/resources/`
In case of the campus being closed we will communicate through the course e-mail list and information in the course website.

Contents of the course

The course follows Sakurai's book. We study chapters 1 to 3 (except sections 2.5, 2.6,3.4, 3.8, 3.9,) and appendices A and B. At the end selected topics from chapter 4 may be included as extra material. If time permits we will also discuss some extra topics such as spin chains, Bell inequality, Quantum Key distribution, etc. That means we include

1.1 The two slits experiment and the Stern Gerlach experiment

1.2 Kets, Bras, and Operators

1.3 Base Kets and Matrix Representations

1.4 Measurements, Observables, and the Uncertainty relation

1.5 Change of Basis

1.6 Position, Momentum, and Translation

1.7 Wave Functions in Position and Momentum Space

2.1 Time Evolution and the Schrödinger equation

2.2 The Schröedinger Versus the Heisenberg Picture

2.3 Simple Harmonic Oscillator

2.4 Schrödinger Wave Equation

3.1 Rotations ang Angular Momentum Commutation Relations.

3.2 Spin $\frac{1}{2}$ Systems and Finite Rotations

3.3 $SO(3)$, $SU(2)$ and Euler Rotations

3.5 Eigenvalues and Eigenstates of Angular Momentum

3.6 Orbital Angular Momentum

3.7 Addition of Angular Momenta

3.10 Tensor Operators

Appendix A

Appendix B