Introduction to Quantum Mechanics II

Fall 2018

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	TUESDAY	THURSDAY
SEP		06
		Overview of the course. Quantum Mechanics in 30 minutes Reading: Chapter 1 Problems: 1.3 1.5 1.7
SEP	11	13
	Linear Algebra and Probability Theory Reading: Sakurai 1.2 Problems: A.1 A.2 A.5 A.11 A.17	Vector spaces, Hilbert space, Kets and Matrix representations Reading: Sakurai 1.3, Griffiths A.5 A.6 Problems: A.18 A.19 A.21 A.25 A.28
SEP	18	20
	Statistical interpretation Reading: Sakurai 1.4, Griffiths 2.1 3.1 3.2 3.3 Problems: Sakurai 1.4, 1.10, 1.27	Change of basis Reading: Sakurai 1.5, Griffiths 3.4 3.5 3.6 Problems: 3.17 3.22 3.24 3.27 3.39
SEP	25	27
	First Exam	Time-independent Perturbation Theory Reading: Section 6.1 Problems: 6.1 6.2 6.4

OCT	02	04
	Degenerate Perturbation Theory Reading: Section 6.2 Problems 6.9 (6.31)	Revision of the hydrogen atom Reading: Sections 4.1.1 4.1.2 4.2 Problems: 4.11 (4.13)
OCT	9	11
	Fine structure of hydrogen Reading: Section 6.3 Problems: 6.16 6.17 6.18 (6.19)	
OCT	16	18
	The Zeeman effect Reading: Sections 6.4 6.5 Problems: 6.20 6.22 6.32	The Variational Principle Reading: Section 7.1 Problems: 7.1 7.4 7.5
OCT	23	25
	Applications to the helium atom and the hydrogen molecule Reading: Sections 7.2 7.3 Problems: 7.6 7.7 (7.11) 7.13 (7.19)	Second Exam
	OCT 30	NOV 01
	The WKB Approximation, Calculating Tunneling rates Reading: Sections 8.1 8.2 Problems: 8.3 8.4	Time-Dependent Perturbation Theory Reading: Section 9.1 Problems: 9.1 9.2 (9.7)

NOV	06	08
	Stimulated Emission and Adsorption of EM waves Reading: Section 9.2 Problems: 9.15 9.16 (9.17)	Spontaneous Emission Reading: Section 9.3 Problems: 9.8 9.9 9.10
NOV	13	15
	Scattering Reading: Sections 11.1 11.2 Problems: 11.2 11.3 11.4	Third Exam
NOV	20	22
	Born Approximation Reading: Section 11.4 Problems: 11.8 11.10 11.11 11.13 (11.14) (11.18)	Thanksgiving Day
NOV	27	29
	Phase shifts Reading: Section 11.3 Problems: 11.5 (11.6) (11.7)	Introducing more uncertainty: large numbers of particles (Stat. Mech.) Reading: Sections 5.1 5.3 5.4.1 5.4.2 Problems: 5.5 5.22 5.23 5.24
DEC	04	06
	Ensemble Averages and the Density Operator Reading: Section 5.4.3 Problems: 5.26 5.27 5.28 5.29	Energy Distributions and Black Body Radiation Reading: Section 5.4.4 Problems: 5.30 5.31 5.34

DEC	11	13
	What is the meaning of it all? Reading: Chapter 12 Problem: Form your opinion about the chapter	
DEC	18 final exam week	20 final exam week

	Themes
	Principles of Quantum Mechanics, and Linear Algebra
	Techniques to solve the Schrödinger Equation, applications to atoms
	Light – Matter interactions (lasers, fluorescence, scattering)
	Large numbers of particles, Quantum Statistical Mechanics (big atoms, metals)
	Exams

Exam 1:	Principles of Quantum Mechanics	Tue Sept 25th
Exam 2:	Techniques to solve the Schödinger Equation	Tue Oct 25th
Exam 3:	Light – Matter interactions	Th Nov 15th
Final Exam:		Mon Dec 17th