科目ナンバリング	U-LAS12 20020 LE57						
授業科目名 <英訳>	Introduction to Quantum Physics-E2 Introduction to Quantum Physics-E2			担当者所属 職名・氏名	工学研究科　講師　Arseniy Aleksandrovich, Kuzmin		
群	自然科学科目群		分野(分類)	物理学(発展)		使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・ 開講期	2026・後期	曜時限	火4	配当学年	主として2回生	対象学生	理系向

[授業の概要・目的]

Quantum mechanics is one of the most successful theories in physics. It describes the physics of the microscopic world: molecular, atomic and subatomic processes. At first, we will follow the history of the quantum mechanics, and start with the black body radiation. The necessity of quantization arises from the failure to describe the black body radiation using classical physics. We will then examine the experimental evidences of the particle-wave duality. The Schrodinger equation is then introduced to describe simplest quantum systems. This course aims to show the necessity of quantum mechanics and to give listeners tools to describe the basic quantum systems.

[到達目標]

To understand the fundamental concepts of quantum mechanics.
To learn mathematical methods which describe quantum objects.

[授業計画と内容]

In this course the following topics are covered:

1. Brief overview of relativistic energy and momentum. When classical physics was not enough anymore.
2. Black body radiation. Classical and quantum approaches.
3. Quantum properties of electro-magnetic radiation: photoelectric effect, Bothe experiment, Compton effect.
4. Rutherford model of atom.
5. Bohr model of atom.
6. Wave properties of particles: De Broglie's wave hypothesis.
7. Experimental conformations of De Broglie's hypothesis. Uncertainty principle.
8. Wave function and Schrodinger equation.
9. Particle in the infinite potential well.
10. One dimensional quantum system: harmonic oscillator.
11. Quantum tunneling of particles through potential barriers.
12. Physical states and operators.
13. Postulates of quantum mechanics.
14. Quantization of angular momentum.
15. Feedback

[履修要件]

It is desirable to take introduction to physics A and B courses. Knowledge of mechanics and wave theory is welcome.

[成績評価の方法・観点]

Evaluation will be based on:
30% homework, attendance, and participation
20% quiz
50% final exam

Introduction to Quantum Physics-E2(2)へ続く↓↓↓

Introduction to Quantum Physics-E2(2)

[教科書]

I. V. Savelyev 『Physics, a general course (vol. 3)』 （Mir Publishers）ISBN:5-03-000900-0

[参考書等]

（参考書）
授業中に紹介する

[授業外学修（予習・復習）等]

Preparation for lectures will include revision of class materials and homework assignments. Detailed instructions will be given during the class.

[その他（オフィスアワー等）]

[主要授業科目（学部・学科名）]