Quantum physics II - course description

General information

Course name	Quantum physics II
Course ID	13.2-WF-FizD-QP-II-S18
Faculty	Faculty of Physics and Astronomy
Field of study	Physics
Education profile	academic
Level of studies	Second-cycle studies leading to MS degree
Beginning semester	winter term 2018/2019

Course information

Semester	3
ECTS credits to win	4
Course type	obligatory
Teaching language	english
Author of syllabus	• prof. dr hab. Piotr Rozmej

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Exam
Class	30	2	-	-	Credit with grade

Aim of the course

To teach the student several general features of quantum systems. To give foundations for various possible applications.

Prerequisites

Knowledge of first and second course of quantum mechanics.

Scope

LECTURE:

- The density operator.

- The evolution operator.

- Gauge invariance.

- Unstable states; lifetimes.

- Bound sates of a particle in a potential well of arbitrary shape.

- Unbound states of a particle in the presence of a potential well or barrier of arbitrary shape.

CLASS:

Essentially the same topics, but with extension of particular calculations and interpretations on several examples.

Teaching methods

Lectures on problems and discussions. Oral practice, in which students solve tasks.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
The student knows methods of studying time evolution of quantum systems.		• a quiz • an exam - oral, descriptive, test and other • an oral response	• Lecture • Class
The student knows gauge invariance and its consequences.		• a quiz • an exam - oral, descriptive, test and other • an oral response	• Lecture • Class
The student is aware of importance of density operator in quantum mechanics.		• a quiz • an exam - oral, descriptive, test and other • an oral response	• Lecture • Class

Outcome description	Outcome symbols	Methods of verification	The class form
Is able to study both bounded and unbounded states of a particle in arbitrary potential.		• a quiz • an exam - oral, descriptive, test and other • an oral response	• Lecture • Class
The student is familiar with unbound states of physical systems their decay and lifetimes.		• a quiz • an exam - oral, descriptive, test and other • an oral response	• Lecture • Class

Assignment conditions

LECTURE: A course credit for the lectures is obtained by taking a final exam composed of tasks of varying degrees of difficulty.

CLASS: During the classes the preparation of the students will be checked as well as their understanding of the lecture content at the time of the lectures.

To obtain a course credit for the exercises 50% of the maximum number of points will be required, which can be achieved through two cumulative tests. A student who achieves at least 10% of the maximum points and who does not exceed the class absence limit has the right to a re sit test of the entire material before the examination date. The result of the exam is also affected by class participation and preparation for the class.

Entrance to the exam requires prior accreditation of the course exercises.

Recommended reading

[1] C. Cohen-Tannoudji, B. Diu, F. Laloe, *Quantum Mechanics,* 1992.

[2] I. Białynicki-Birula, M. Cieplak, J. Kamiński, *Theory of quanta,* PWN, Warszawa 2001.

[3] Pdf file delivered to the students.

Further reading

[1] A. L. Schiff, *Quantum mechanics,* PWN, Warszawa 1987.

Notes

Modified by dr hab. Piotr Lubiński, prof. UZ (last modification: 28-06-2018 23:02)

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