

Subject card

Subject name and code	Nuclear and Elementary Particles Physics, PG_00182654						
Field of study	Physics						
Date of commencement of studies	October 2025		Academic year of realisation of subject			2025/2026	
Education level	Master's studies		Subject group			Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study	
Mode of study	full-time studies		Mode of delivery			at the university	
Year of study	1		Language of instruction			Polish	
Semester of study	2		ECTS credits			6.0	
Learning profile	academic		Assessment form			exam	
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Angelina Łobejko				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	30.0	0.0	0.0	75
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	75		0.0		75.0	150
Subject objectives	Deepening and systematising students' knowledge of the structure and properties of atomic nuclei and elementary particles, with particular emphasis on contemporary experimental methods and a small amount of theoretical considerations. Another important element is to show the connections between nuclear and particle physics and other areas of research (astrophysics, condensed matter physics, medical and technological applications).						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[FIZMU2_W01] has advanced knowledge of general physics and in-depth knowledge of various areas of physics; knows the history of the development of physics and its importance for the progress of exact and natural sciences, cognition of the world and social development	The student has in-depth knowledge of the properties and structure of atomic nuclei, as well as the mechanisms of nuclear interactions and the processes of nuclear decay and reactions. Students have detailed knowledge of the interaction of ionising radiation with matter and its impact on living organisms. In addition, students have knowledge of the types of elementary particles, their properties and the fundamental interactions between them, understanding how these processes affect the structure of matter and the phenomena observed in nuclear and particle experiments. In addition, students understand the relationships between nuclear physics and particle physics, as well as their significance for other fields of science.	[SW4] test/exam - oral or written [SW3] text preparation/written work
	[FIZMU2_U09] can work independently or in a team	The student is able to independently carry out research and experimental tasks in the field of nuclear physics and elementary particles, planning experiments, analysing data and formulating conclusions. They are also able to cooperate effectively in a research team, sharing knowledge, experience and measurement results, as well as contributing to the joint solving of scientific problems and interpretation of experimental results.	[SU8] observation of student's independent or team work
	[FIZMU2_K08] is ready to form competent opinions on advanced professional issues and opinions on certain issues of public interest	The student is ready to formulate competent opinions on advanced issues in nuclear physics and elementary particles, including nuclear processes, fundamental interactions and applications of ionising radiation. They are eager to take on challenges to present reliable, scientifically based opinions on issues in nuclear physics and nuclear technology that may be the subject of public debate, taking into account aspects of safety, ethics and impact on society.	[SK1] oral statement/conversation/discussion [SK4] test/exam - oral or written
	[FIZMU2_K02] is aware of the conclusive role of experiment in the verification of physical theories; is aware of the scientific method in the accumulation of knowledge	The student is aware of the key role of experimentation in verifying models and theories in nuclear physics and elementary particle physics. They understand the importance of the scientific method in gathering and critically evaluating knowledge, and are able to appreciate the value of reliable experimental data and a systematic approach to solving scientific problems. The student demonstrates an open attitude towards new research results and is ready to apply the scientific method in teamwork and research.	[SK2] presentation/project/paper/report [SK3] text preparation/written work [SK4] test/exam - oral or written

	Course outcome	Subject outcome	Method of verification
	[FIZMU2_W06] has knowledge of the current directions of development of physics and fundamental dilemmas of modern civilization	The student has in-depth knowledge of current research trends in nuclear physics and elementary particle physics, including the latest experimental and theoretical achievements. They understand the fundamental challenges and dilemmas of contemporary science and civilisation resulting from the applications of nuclear energy, radioactive technologies and research on elementary particles. They are able to assess the significance of these discoveries in the broader context of natural sciences, technology and society	[SW4] test/exam - oral or written [SW3] text preparation/written work
	[FIZMU2_K01] knows the limitations of his own knowledge and skills; can formulate questions precisely; understands the need for further education and other	The student is aware of the limitations of their knowledge and skills in nuclear physics and elementary particles and is able to precisely formulate research questions concerning complex experimental and theoretical problems. They are open to the need for further self-education, following current trends in nuclear physics and elementary particle physics research, and supporting the development of others' knowledge through teamwork and teaching. The student appreciates the importance of exchanging experiences and information in research and teaching, actively participating in team activities, as well as supporting the development of others' knowledge and promoting a culture of continuous learning.	[SK1] oral statement/conversation/discussion [SK3] text preparation/written work
	[FIZMU2_U01] is able to apply the scientific method in solving physical problems, conducting experiments and reasoning	The student is able to independently apply the scientific method in solving advanced problems related to the structure and properties of atomic nuclei and elementary particles. They are able to plan and carry out nuclear and particle experiments, selecting appropriate theoretical models, computational methods and measurement tools. The student is able to analyse the results of experiments and calculations, interpret them critically and formulate conclusions in line with the current state of knowledge in the field of nuclear physics and elementary particles.	[SU2] presentation/project/paper/report [SU3] text preparation/written work [SU4] test/exam - oral or written
Subject contents	not applicable		
Prerequisites and co-requisites	A. Formal requirements: Fundamentals of classical physics, Fundamentals of quantum physics. B. Prerequisites: Knowledge of issues related to the structure of the atom. Knowledge of the fundamentals of mechanics and the fundamentals of differential and integral calculus.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	report	51.0%	30.0%
	exam	51.0%	50.0%
	colloquium	51.0%	20.0%
Recommended reading	Basic literature	not applicable	
	Supplementary literature	not applicable	
	eResources addresses		
Example issues/ example questions/ tasks being completed	not applicable		
Work placement	Not applicable		

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