Module title: Introduction to Relativistic Physics and Classical Field Theory

Abbreviation: 11-RRF-202-m01

Module coordinator: Managing Director of the Institute of Theoretical Physics and Astrophysics

Module offered by: Faculty of Physics and Astronomy

ECTS: 6

Method of grading: numerical grade --

Duration: 1 semester

Module level: undergraduate

Other prerequisites: --

Contents:

Principles of the special theory of relativity, relativistic mechanics, covariant formulation in the Minkowski space, basic concepts of classical field theory using the example of the scalar field. Electrodynamics as Relativistic Field Theory, Conservation Quantities, Currents and Noether Theorem. Elements of relativistic hydrodynamics as well as elementary foundations of the general relativity theory for special metrics, e.g. black holes.

Intended learning outcomes:

Knowledge of the principles of special relativity and standard methods for solving classical relativistic problems in covariant representation. Safe handling of classical relativistic field theories as well as a rough overview of the basics of general relativity. The students should be prepared for further elective courses in theoretical physics in the Master's program.

Courses (type, number of weekly contact hours, language — if other than German)

V (3) + R (1)

Module taught in: German or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes).

If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest.

Language of assessment: German and/or English

Assessment offered: Once a year, summer semester

Allocation of places: --

Additional information: --

Referred to in LPO I (examination regulations for teaching-degree programmes):

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Module appears in:

Bachelor' degree (1 major) Physics (2020)
Bachelor' degree (1 major) Nanostructure Technology (2020)
Bachelor' degree (1 major) Mathematical Physics (2020)
Bachelor' degree (1 major) Quantum Technology (2021)