

Secondary Area of Specialization

General Theory of Relativity / Quantum Field Theory

Module No.: MN-P-PN-GR-QFT

status quo 08.05.2012

	HPW	estimated effort (h)	credit points
Lecture Course	4		
Problem Class	2		
Total	6	240	8

Contents

Core Courses:

- Relativity and Cosmology (4+2 hpw): Gravitation as geometry of spacetime, differential geometry, Einstein field equations, Schwarzschild solution, experimental tests, gravitational waves
- Quantum field theory I (4+2 hpw): Second quantization and applications, functional integrals and their analysis, perturbation theory and mean-field methods

Literature

Hartle, Gravity (Addison-Wesley)

Misner Thorne Wheeler, Gravitation (Freeman)

Mukhanov, Physical Foundations of Cosmology (Cambridge University Press)

Ryder, Quantum Field Theory (Cambridge University Press)

Altland Simons, Condensed Matter Field Theory (Cambridge University Press)

Organization

Students take either one of the two core courses (4+2 hpw).

Examinations

The module is passed by passing an oral examination covering the topics of the course attended by the student. To be admitted to the exam, students must actively participate in the problem sessions (including the solution of homework problems).

The grade given for the module is equal to the grade of the oral examination.

Aims

The module provides the material which is required in order to understand the conceptual and methodological foundations of general relativity/quantum field theory and to recognize their significance in disciplines such as astrophysics, elementary particle physics, and condensed matter physics.

Prerequisites for Participation

Advanced Quantum Mechanics (GR) or Statistical Physics (GR, QFT)

Prerequisites

Basic knowledge in theoretical physics at the level of the bachelor courses in physics

Frequency

Alternates between GR and QFT, perhaps QFT I annually

Soft Skills

None

Use in Other Courses of Study

As elective subject in other M.Sc. programs

Coordinators

Martin Zirnbauer