



LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

Winter Term 2023/2024

General Theory of Relativity

G. Moortgat-Pick

Course Description:

This lecture will provide an introduction to the basics of the theory of general relativity including applications such as black holes and cosmology.

The following topics will be covered:

- recapitulation of the theory of Special Relativity: four-vector formalism, accelerated observers,
- manifolds and curved spaces,
- basics of tensors and differential forms,
- gravitation and Einstein's field equations,
- the Schwarzschild solution and Black Holes,
- gravitational waves,
- cosmology: maximally symmetric spaces and the Friedmann–Robertson–Walker metric.

Prerequisites:

Knowledge of theoretical physics on the level of a bachelor's degree in physics is strongly recommended. Basic knowledge of special relativity.

Literature:

B. Bahr, *Tutorium Allgemeine Relativitätstheorie*; T. Fließbach, *Allgemeine Relativitätstheorie*; J.B. Hartle, *Gravity*; C.W. Misner, K.S. Thorne, J.A. Wheeler, *Gravitation*.

Date and Place: Wed, 10:15–11:45, Hörsaal, Building 61, Bahrenfeld
Fri, 10:15–11:45, Hörsaal, Building 61, Bahrenfeld

Problem Classes: Wed, 12:30–14:00, Hörsaal, Building 61, Bahrenfeld
and Fri, 12:00–13:30, Hörsaal, Building 61, Bahrenfeld
(Starting on: 25 October 2023)

Starting on: 18 October 2023
