



Universität Hamburg

DER FORSCHUNG | DER LEHRE | DER BILDUNG

CHAMPP

CENTER IN HAMBURG FOR  
ASTRO-, MATHEMATICAL AND  
PARTICLE PHYSICS

LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

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Winter Term 2021/2022

# General Theory of Relativity

Thomas Konstandin

## Course Description:

This course covers the basics of general relativity and some applications. As a preparation special relativity is reviewed, in particular the concept of symmetries and the resulting conservation laws. Next, the mathematical tools for general relativity are developed: Vectors, tensors, manifolds, and metrics. Third, the Einstein equations and its immediate consequences are discussed. The last part covers some applications, which might include: cosmological models, black holes, Penrose diagrams and gravitational waves.

## Prerequisites:

The course requires a basic understanding of special relativity, classical field theory (Lagrangian dynamics) and vector calculus.

## Literature:

S. Weinberg, *Gravitation and Cosmology*, Wiley, 1972

**Date and Place:** Wed, 10:15–11:45, Hörsaal, Building 61, Bahrenfeld  
Fri, 10:15–11:45, Hörsaal, Building 61, Bahrenfeld  
**Problem Classes:** Fri, 12:00–13:30 / 14:15–15:45, Hörsaal, Building 61  
**Starting on:** 13 October 2021

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