EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

Mathematisch-Naturwissenschaftliche Fakultät

Fachbereich Mathematik

AB Geometrische Analysis, Differentialgeometrie und Relativitätstheorie

Wintersemester 2025/2026

Lecture

Advanced Topics in Mathematical Relativity (kurze Version)

Lecturer: Prof. Dr. Gerhard Huisken
Start: Friday, 17th October 2025
Time: Fridays, 10:00-12:00
Place: C4H33 (C-Building Mathematik/Physik)
Tutorial: 2 hours/week **Tutor:** Ariadna León Quirós **Start:** Thursday, 16th October 2025
Time: Thursdays, 16:00-18:00 **Place:** C6H10 (C-Building Mathematik/Physik)
Study programs: Master in Mathematics and in Mathematical Physics
Modul number: MAT- 65-24; 6 ECTS points

Description: The course will concentrate on complete 3-dimensional Riemannian manifolds that can be interpreted as space-like slices in a 4-dimensional Lorentzian manifold describing an isolated gravitating sytem such as a star, a binary or a black hole. We use partial differential equations to explore geometric structures inside the 3-manifold that can be used to model concepts such as “mass,” “center of mass”, “momentum” or “black hole horizon”.

Prerequisites: Introductory course to Differential Geometry and introductory course to Partial Differential Equations; an introductory course to Mathematical Relativity is helpful, but not abolutely necessary.

Literature: Hawking-Ellis, The large scale structure of space-time, Cambridge University Press

Exam: Written or oral exam depending on course size.