Master class General Relativity Theory
SS 19, Karsten Grosse-Brauckmann

TECHNISCHE UNIVERSITÄT DARMSTADT

Language English

Class Fri 15:20, room 301 (from 2nd class on)

Problem session run by Brice Loustau
Tue 15:20, room 301, starting on April 30

Class revising Riemannian geometry
April 23, Tue 15:20, room 301

Future and Past

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Contents

- Special relativity and setup for general relativity.
- Einstein equation
- Special solutions and black holes: Schwarzschild, Kerr, etc.
- Further topics, e.g., cosmology, gravitational waves, ...

Prerequisites from Riemannian Geometry

- differentiable manifolds
- semi-Riemannian metrics
- Levi-Civita connection/covariant differentiation
- geodesics and exponential map
- curvature (Riemann, Ricci, scalar) and Jacobi fields

Exam

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Oral exams for Mathematicians

- in Ergänzungsbereich with 6 points
- as part of a Vertiefungsprüfung (18 points)
  e.g.: Riemannian geom. + manifolds or Riemann surfaces + GRT

Physicists?

References

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Textbook: O'Neill: Semi-Riemannian Geometry (Academic Press)

Books, physics:

- Straumann
- d'Inverno, Ray

Classical physics texts:

- Misner, Thorpe, Wheeler
- Hawking, Ellis

Books, mathematics:

- Kühnel: Differentialgeometrie, Kap.
- Besse: Einstein manifolds, Ch. 3