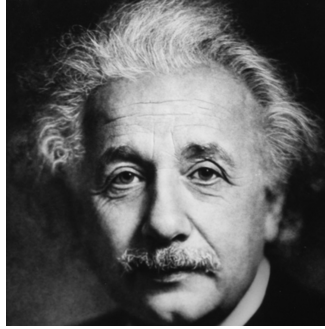


General Relativity



Content

- Special Relativity: Lorentz transformations, relativistic mechanics
- Equivalence principle: geodesic equation, Newtonian limit
- Riemann differential geometry: covariance principle, curvature tensor
- Einstein field equations: Schwarzschild metric, black hole, no-hair theorem
- Experimental tests: perihel precession, geodesic precession, Thirring-Lense effect
- Gravitational waves: linearization of field equations, Nobel Prizes 1993 and 2017
- Outlook: star models, cosmology

References

- T. Fließbach, *Allgemeine Relativitätstheorie*, Spektrum Verlag
- H. Grote, *Gravitationswellen - Geschichte einer Jahrhundertentdeckung*, C.H. Beck
- J. B. Hartle, *Gravity - An Introduction to Einstein's General Relativity*, Addison Wesley
- U. E. Schröder, *Gravitation: Eine Einführung in die allgemeine Relativitätstheorie*, Verlag Harri Deutsch
- E. Schrödinger, *Space-Time Structure*, Cambridge University Press
- H. Stephani, *Allgemeine Relativitätstheorie*, Deutscher Verlag der Wissenschaften
- R. Vaas, *Signale der Schwerkraft*, Kosmos
- S. Weinberg, *Gravitation and Cosmology - Principles and Applications of the General Theory of Relativity*, John Wiley & Sons
- S. Weinberg, *Cosmology*, Oxford University Press

Organizational Remarks

- **Lectures:**

- 2 hours per week
- 4 ECTS credits
- Certificate for active participation:
 - * Seminar talk of 15 minutes at semester end
 - * Suggestions for topics announced middle of June

- **Exercises:**

- 2 hours per week
- 4 ECTS credits
- Certificate for active participation:
 - * 50 % from all points of all exercise sheets
 - * Five times calculations at the black board
- Two students can submit one group solution of a problem set for evaluation.
- Drop the solutions in the post box on the 5th floor of building 46 or, in case of illness/quarantine, send them via email to axel.pelster@physik.uni-kl.de

- **Oral module exam possible**