

Introduction to General Relativity

Program

1. Special Relativity:
 - 1.1 The postulates
 - 1.2 Lorentz transformations
 - 1.3 Minkowski space
 - 1.4 Velocities and proper time
 - 1.5 Dynamics
 - 1.6 Electromagnetism
 - 1.7 Tensorial formulation

2. Gravitation and equivalence principle
 - 2.1 Extending the relativity principle to any frame
 - 2.2 Mach's principle
 - 2.3 Equivalence principle
 - 2.4 The Basis of General Relativity
 - 2.5 Geodesics: the free particle's trajectories
 - 2.6 Classical limits
 - 2.7 Proper time, proper length

3. Gravitational field and Einstein's equations in the vacuum
 - 3.1 Equation in the vacuum
 - 3.2 Covariant Maxwell's equations
 - 3.3 The Schwarzschild's solution
 - 3.4 The Schwarzschild's geodesics
 - 3.5 Advance of the perihelion of *Mercury*
 - 3.6 *deflection of light*
 - 3.7 *Schwarzschild's black holes*

4. Gravitational field and matter
 - 4.1 Einstein's equations in matter
 - 4.2 Weak field limit: linearized equations
 - 4.3 Newtonian limit
 - 4.4 Gravitational waves
 - 4.5 Schwarzschild's metric in matter
 - 4.6 *Cosmological models*