HE398 Jan 3:0

General Relativity

Instructor

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Teaching Assistant

Email:

Department: Centre for High Energy Physics, Physics

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

Introductory general relativity course targetting 3rd and 4th year undergraduates, physics graduate students, high energy physics graduate students.

Prerequisites

Classical mechanics, Vector calculus, QFT I (in the end).

Syllabus

Review of tensor calculus and properties of the Riemann tensor.

Killing vectors, symmetric spaces. Geodesics. Equivalence principle and its applications. Scalars, fermions and gauge fields in curved space-time. Einstein's equations and black hole solutions. Schwarzschild solution, Motion of a particle in the Schwarzschild metric. Kruskal extension and Penrose diagrams. Reissner-Nordstrom solution, Kerr solution. Laws of black hole physics. Gravitational collapse. Oppenheimer-Volkoff and Oppenheimer-Synder solutions,

Chandrasekhar limit. Csomological models, Friedmann-Robertson-Walker

metric. Open, closed and flat universes. Introduction to quantizing

fields in curved spaces and Hawking radiation.

Course outcomes

Should have a working knowledge of Einstein's general relativity and some modern research areas.

Grading policy

50% midterm 50% finals.

Assignments

Resources