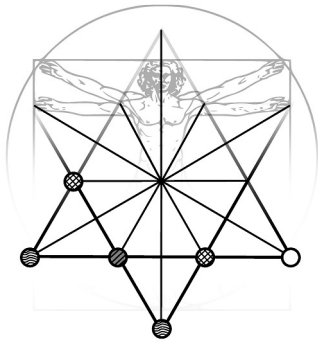


Symmetries, Geometric Structures and Holonomy

(Winter Semester 2018/19)



Course ID: 1120-4SGSH
Department: Faculty of Physics
Lecture: Tuesday, 15:15-17:00, room 2.06
Class: Thursday, 14:15-16:00, room 1.01

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Beyond Riemannian and Lorentzian geometry, there are various important geometries that arise naturally in mathematics and physics. Classical examples are conformal, projective, and CR geometry. The goal of this course is to introduce students to these geometries and to provide them with tools to study them in an invariant manner. A particular focus will be on the study of conformal geometry.

The course is aimed at both physics and mathematics students. Depending on the knowledge and the interests of the students, we shall decide which of the more advanced topics to cover in detail. There will be tutorial sessions in which all geometric concepts will be discussed on examples.

Topics:

- Lie groups and homogeneous spaces
- Connections, curvature, and holonomy
- The Killing equation and the conformal Killing equation and their prolongations
- Conformal invariants and conformally invariant differential operators
- CR structures and the Kerr theorem
- Tractors and Cartan connections (if time permits)

Prerequisites

Standard courses on algebra and analysis, and familiarity with basic concepts from differential geometry (e.g. manifolds, differential forms).