

PD Dr. Georg Hein and Dr. Frederik Witt Graduate school: "Manifolds of special holonomy and Moduli spaces of vector bundles over Riemann surfaces"

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Synopsis. We discuss Riemannian manifolds of special holonomy, i.e. the canonical Levi-Civita connection reduces to a non-trivial, proper subgroup of $SO(n)$. Manifolds of special holonomy play a central rôle in modern differential geometry. They also naturally arise in String- and M-theory compactifications. The aim of this workshop is to show how the geometry can be understood and analysed by using representation theoretic techniques. We will mainly discuss one example, namely G2-manifolds, and explain how their geometry links into physics. In this context, we will also mention Hitchin's variational principle which is a kind of non-linear Hodge theory.

Prerequisites. Basics of Riemannian geometry. Good introductory material can be found in M.Nakahara's book "Geometry, Topology and Physics" or D.Joyce's book "Compact Manifolds with special holonomy". For additional literature, please click on the link below.

Synopsis. In the second part of the workshop, we first discuss the general theory of Riemann surfaces before we focus on moduli spaces of vector bundles.

Prerequisites. Only basics of algebraic geometry are required.

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