



Wintersemester 2020/21

Oberseminar
Geometrische Analysis, Differentialgeometrie und Relativitätstheorie

Am Donnerstag, den 26.11.2020 spricht um 15:30 per Videoübertragung

Prof. Dr. Bernd Ammann
(Universität Regensburg)

über das Thema

Ricci-flat metrics, parallel spinors on Riemannian and Lorentzian manifolds and the dominant energy condition

(based on joint work with Klaus Kröncke, Hartmut Weiß, Frederik Witt, Olaf Müller and Jonathan Glöckle)

It is an interesting and challenging problem to construct Ricci-flat metrics. There are several famous constructions to obtain compact Riemannian Ricciflat manifolds besides flat manifolds: e.g. Yau's solution of the Calabi conjecture, or Joyce's construction of "manifolds with special holonomy". All these constructions share the property that a finite covering of these spaces carry a parallel spinor. We will call such metrics structured Ricci-flat metrics, as the parallel spinor yields a structural reason for the Ricci-flatness. However, it remains mysterious whether compact non-structured Ricci-flat Riemannian manifolds exist. In the talk we explain how the existence of a parallel spinor implies Ricciflatness in the Riemannian case, and to what extent this statement remains true in the Lorentzian setup. I will discuss that the pre-moduli space of structured Ricci-flat Riemannian metrics on a compact manifold is a smooth, finitedimensional manifold, which carries a natural bundle, given by parallel spinors, with a natural connection. Curves in this moduli space yield solutions of the constraint equation for the Cauchy problem for Lorentzian manifolds with parallel spinors. In the last part of the talk we discuss Lorentzian manifolds (strictly) satisfying the dominant energy condition, or more exactly initial data pairs (g, K) for such manifolds. The space of such pairs has a rich topology, which can be detected by a Lorentzian analogue of Hitchin's χ -invariant. A related rigidity discussion will lead us again to the same Cauchy problem.

Hierzu wird herzlich eingeladen. Bei Interesse bitte per E-Mail an angelika.spoerer-schmidle@uni-tuebingen.de wenden, um den Link zur Videoübertragung zu erhalten.

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