



4. ANGEL Meeting

ANALYSIS AND GEOMETRY IM LÄNDLE

Friday, January 30th, 2026, Tübingen

12:30 Lunch Mensa

All talks will take place in the Hörsaalzentrum (HZ) in 7 E 02

14:00-15:00

PhD Brian Harvie

(Universität Kopenhagen)

Static Black Holes with a Negative Cosmological Constant

The classification of stationary black hole solutions of the Einstein field equations, broadly referred to as the "no-hair conjecture", is a challenging and fundamental line of research in general relativity. The problem is more tractable for black hole spacetimes which are static, but even under this stronger assumption the existing results are mostly limited to static black holes with zero or positive cosmological constant. In this talk, I will present a geometric inequality for isolated static vacuum black holes with a negative cosmological constant which has far-reaching implications for their geometry and uniqueness. The inequality relates the surface gravity, area, and topology of a horizon in a static spacetime to its conformal infinity, and equality is achieved only by the Kottler black holes. From this, we deduce several new static uniqueness theorems for Kottler. Namely, we show: (1) the Kottler black hole over the sphere which minimizes surface gravity is unique, (2) the Kottler black hole over the torus is unique, assuming the horizons have non-spherical topology, and (3) uniqueness for the higher-genus Kottler black holes is equivalent to the Riemannian Penrose inequality. This is based on joint work with Ye-Kai Wang.

15:00-15:30 Coffee Break

15:30-16:30

Olivia Vicanek Martinez

(Universität Tübingen)

**A geometric choice of asymptotically Euclidean coordinates
via STCMC-foliations**

Asymptotically Euclidean 3-dimensional initial data sets were shown to carry asymptotic foliations of closed hypersurfaces with constant spacetime mean curvature (Cederbaum-Sakovich, 2021). In order to prove the inverse implication of this result and hence the geometric characterization of being asymptotically Euclidean, we start from the purely geometric foliation and construct asymptotic coordinates from it, exploiting the properties of the induced Laplacian of the foliation leaves via a delicate analysis. We show that these coordinates are asymptotically Euclidean, and moreover seem geometrically meaningful and well-adapted to the center of mass. This is joint work with A. Piubello.

16:30-16:45 Coffee Break

16:45-17:45

Prof. Dr. Uwe Semmelmann

(Universität Stuttgart)

Quaternion Kähler manifolds of non-negative sectional curvature

Quaternion Kähler manifolds, i.e., Riemannian manifolds with holonomy contained in $\mathrm{Sp}(m)\mathrm{Sp}(1)$, are Einstein. In the case of positive scalar curvature, there is a longstanding conjecture by LeBrun and Salamon stating that all such manifolds should be symmetric. So far, the conjecture has been confirmed only up to dimension 12. In the first part of my talk I will give an introduction to the geometry of quaternion Kähler manifolds of positive scalar curvature. In the second part I will make a few remarks on the proof of the conjecture under the additional assumption of non-negative sectional curvature. This extends earlier work by Berger, who proved that quaternion Kähler manifolds of positive sectional curvature are isometric to the quaternionic projective space. My talk is based on a joint article with Simon Brendle and on earlier work by Simon Brendle.

18:30 Dinner Ratskeller

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