EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

Mathematisch-Naturwissenschaftliche Fakultät

Fachbereich Mathematik
AB Geometrische Analysis, Differentialgeometrie und Relativitätstheorie

Oberseminar
Geometrische Analysis, Differentialgeometrie und Relativitätstheorie

Am Donnerstag, den **25.01.2024** spricht um **14 Uhr s.t.** im Hörsaal **N15 (C-Bau) und über Zoom**

Albachiara Cogo
(UNIVERSITÄT TÜBINGEN)

über das Thema

On ancient solutions to fully nonlinear curvature flows

Geometric flows describe the evolution of Riemannian manifolds with infinitesimal deformation ruled by the intrinsic or extrinsic geometry of the object at each time. The nonlinear nature of the parabolic equations describing such flows leads to the development of singularities, the detailed study of which has been crucial in order to exploit geometric flows in the proofs of important results in geometry and topology since the pioneering works of Hamilton in 1982. Ancient solutions, namely solutions that exist for all times in the past, typically arise as dilations (i.e. blow-up limits) of singularities and tend to exhibit rigidity properties; therefore, classification results for these solutions are essential for the analysis of singularity formation.

While Ricci flow is the canonical example of intrinsic curvature flow, Mean Curvature flow (MCF) is the correspondent model for extrinsic curvature flow. In particular, the norm of the normal velocity at every point a solution to MCF is equal to the mean curvature, which is the sum of the principal curvatures (i.e. eigenvalues of the second fundamental form) at the point. Other scalar geometric quantities can be obtained via symmetric (convex or concave) functions of the principal curvatures and can give rise to (parabolic) geometric flows, which preserve different classes of hypersurfaces. While locally the mean curvature reads as a quasilinear elliptic second-order operator, the corresponding PDE for all the other scalar quantities is fully nonlinear. A key example we have in mind is the so-called “G-flow” introduced by Brendle and Huisken in 2017, which preserves 2-convexity; they used it to prove a remarkable classification result for compact Riemannian manifolds.

In this talk, based on joint work with S. Lynch and O. Vicanek Martinez, we will address the classification of ancient solutions to fully nonlinear curvature flows for hypersurfaces. Under natural conditions on the speed, we show that every convex, noncollapsing, uniformly two-convex ancient solution which is also noncompact is either a self-similarly shrinking cylinder or else is a rotationally symmetric translating soliton. For a large class of flows, this yields a complete classification of the blow-up limits that can arise at a singularity of a solution that is compact, embedded, and two-convex.

Den Zoom-Link erhalten Sie per E-Mail von Frau Martina Neu.

For participating online, please sign up by sending an email to Martina Neu.

Hierzu wird herzlich eingeladen.

Carla Cederbaum, Gerhard Huisken, zusammen mit Jan Metzger (Potsdam)