



Kolloquium über Reine Mathematik

Einladung zu einem Vortrag

Dienstag, 4. Juli 2023

17 Uhr, Geom H4

Prof. Melanie Graf
(Hamburg)

Classical singularity theorems and recent extensions

Abstract:

The singularity theorems of R. Penrose and S. Hawking from the 1960s are beautiful examples of purely mathematical results in Lorentzian Geometry with wide physical implications for General Relativity. They combine analytic and geometric techniques to show that any spacetime with a smooth Lorentzian metric satisfying certain curvature bounds and causality assumptions must be geodesically incomplete, providing a mathematical basis for the generic existence of singularities like black holes or the Big Bang. Mathematically these theorems are examples for a general class of results detailing the global influence of curvature on lengths, areas and volumes. Despite their great success these classical theorems still have some drawbacks, among them that the imposed conditions on the curvature and the metric regularity are not satisfied in many physically relevant situations.

In my talk we will first study the classical theorems with the aim of providing a generally accessible introduction to the topic. After this I'll give an overview of some recent improvements, presenting some of the challenges arising in this process and possible techniques to overcome them.

**Vor dem Vortrag (ab 16.30 Uhr) stehen im Foyer vor Hörsaal H4
Kaffee und Tee bereit.**