Oberseminar Topologie: 11.11.2024

Dennis Wulle, Universität Münster

Title: On the Geometry and Topology of Eschenburg Orb

Abstract: Studying the topology of Riemannian manifolds under curvature constraints is a central topic in Riemannian geometry. Lower curvature bounds, such as non-negative or positive sectional curvature are of special importance. While numerous examples with non-negative curvature are known, positively curved manifolds appear rarely, creating a sharp contrast with the few known topological obstructions separating these two classes. Extending the study to more singular spaces, like orbifolds, offers the potential to overcome both the shortage of examples and the lack of obstructions even in the smooth category. In this context, we study the geometric and topological properties of Eschenburg orbifolds, which provide an infinite family of non-negatively and positively curved spaces in dimension six. In fact, we present restrictions of the singular set imposed by positive sectional curvature and compute the orbifold cohomology rings of the entire family. By merging these two perspectives, we observe a distinct behaviour of the orbifold cohomology groups of certain positively curved subfamilies compared to their non-negatively curved counterparts.