Rafael Dahmen (Karlsruhe)
Isometry Groups and Pro-Lie Theory
A pro-Lie group is a group that can be effectively approximated by (finite-dimensional real) Lie groups. The well-established structure theory of pro-Lie groups shares remarkable similarities with that of Lie groups. In this talk, we will explore their emergence as isometry groups of certain infinite-dimensional metric spaces with curvature constraints.

David Degen (Karlsruhe)
Moduli spaces of hyperkähler metrics
In this talk, I will provide a brief introduction to compact hyperkähler manifolds, which are Riemannian manifolds with holonomy group $\mathrm{Sp}(n)$. The main objective of this presentation is to offer insights into the global topology of the space of isometry classes of hyperkähler metrics, i.e. the moduli space.

Anand Dessai (Fribourg)
Even dimensional manifolds which carry infinitely many geometrically distinct metrics of positive Ricci curvature
Let us call two metrics of positive Ricci curvature on a closed manifold M *geometrically distinct* if they represent different components in the moduli space of all Ric>0-metrics of M. Manifolds which carry infinitely many geometrically distinct metrics of positive Ricci curvature have been exhibited in odd dimensions. In my talk I will first briefly survey the known results. Then I will discuss an instance in which this property can be "lifted" to obtain even dimensional manifolds which carry infinitely many geometrically distinct metrics of positive Ricci curvature. Eta invariants are used to distinguish these metrics.

Georg Frenck (Augsburg)
Spaces of positive scalar curvature metrics on totally nonspin manifolds
Given a manifold M, we consider the space of all metrics of positive scalar curvature. It has been shown that the homotopy type of this space is highly nontrivial if M admits a spin structure by adhering to the index theory of the Dirac operator. In this talk, I will investigate if it is possible to import some of these results to study this space if the M is totally nonspin, i.e. if its universal cover does not admit a spin structure. More precisely, I will answer the following 3 questions:

1. Can one use the index theory on a codimension 0 spin-submanifold to study the space of psc-metrics on M?
2. Can one use the index theory on the boundary to study the space of psc-metrics on a totally nonspin manifold M with spin boundary?
3. Are there ways to study the space of psc-metrics on M without employing index theory at all?

Helge Frerichs (Augsburg)
Scalar curvature on manifolds with noncompact boundary
The talk presents a general deformation principle for boundary conditions of metrics with lower scalar curvature bounds that has been developed by Bär and Hanke in case of manifolds with compact boundary.

I will explain how to generalize the result to the noncompact case. Moreover, I will provide an outlook on possible adaptations of the deformation principle for further geometric properties.

Sam Hagh Shenas Noshari (Fribourg)
On the equivariant cohomology of certain generalizations of symmetric spaces
The class of Γ-symmetric spaces forms a vast generalization of symmetric spaces. Previous results make it conceivable that their isotropy action is equivariantly formal, and we provide evidence for this in case that $\Gamma = \mathbb{Z}_2 \times \mathbb{Z}_n$. This in particular implies that such spaces are formal in the sense of Rational Homotopy Theory.

Bernhard Hanke (Augsburg)
Scalar curvature rigidity
Lower scalar curvature bounds on spin Riemannian manifolds exhibit remarkable extremality and rigidity phenomena determined by spectral properties of Dirac operators. For example, a fundamental result of Llarull states that there is no smooth Riemannian metric on the n-sphere which dominates the round metric and whose scalar curvature is greater than or equal to the scalar curvature of the round metric, except for the round metric itself. We discuss related results in low regularity situations and on non-compact manifolds.

Andreas Kollross (Stuttgart)
Totally geodesic submanifolds in exceptional symmetric spaces
Joint work with Alberto Rodríguez-Vázquez. I will speak about our recent article where we classify maximal totally geodesic subspaces in exceptional Riemannian symmetric spaces. Since the maximal subspaces containing flat factors have been classified by Berndt and Olmos, it suffices to find the semisimple ones. We show that these correspond to subalgebras in the Lie algebra of the isometry group which are maximal among the semisimple subalgebras without compact ideals. To find all such subalgebras of simple real Lie algebras, we use earlier classification results by Dynkin, de Graaf-Marrani and Komrakov.

Philippe Kupper (Karlsruhe)
The Chas-Sullivan product on symmetric spaces
On the homology of the free loop space of a closed manifold M there exists the so-called Chas-Sullivan product. It is a product defined via the concatenation of loops and can, for example, be used to study closed geodesics of Riemannian or Finsler metrics on M. In this talk I will outline how one can use the geometry of symmetric spaces to partially compute the Chas-Sullican product. In particular, we will see that the powers of certain non-nilpotent classes correspond to the iteration of closed geodesics in a symmetric metric. This talk is based on joint work with Maximilian Stegemeyer.

Artem Nepechiy (Karlsruhe)
Geometric conditions and regularity
The talk will mainly deal with spaces which have a lower curvature bound in the sense of Alexandrov. A priori such spaces appear very singular, but under geometric conditions an amazing number of regularity properties can be recovered.

Philipp Reiser (Fribourg)
Positive intermediate Ricci curvature: an introduction and new examples
Positive intermediate Ricci curvature is a family of interpolating curvature conditions between positive sectional and positive Ricci curvature. While many results that hold for positive sectional or positive Ricci curvature have been extended to these intermediate conditions, only relatively few examples are known so far. In this talk, after a brief introduction, I will present several extensions of construction techniques from positive Ricci curvature to these curvature conditions, such as surgery and bundle techniques. As an application one obtains a large class of new examples of manifolds with a metric of positive intermediate Ricci curvature. This is joint work with David Wraith.

Lukas Schönlinner (Augsburg)
Topological Complexity of Closed 3-Manifolds
This talk is about the results of my master thesis, which is concerned with the topological complexity of closed 3-manifolds. This is a homotopy invariant of path-connected spaces which originally comes from robotics. The idea is to use the prime decomposition of closed 3-manifolds to compute this number in a systematic way. This talk gives an overview of known results and presents some new discoveries. In particular, we discuss the topological complexity of connected sums.

Paul Schwahn (Stuttgart)
The Lichnerowicz Laplacian on normal homogeneous spaces
The Lichnerowicz Laplacian Δ_L is an interesting differential operator on Riemannian manifolds, generalizing the Hodge-de Rham Laplacian on differential forms to tensors of arbitrary type. It features prominently in the study of the linear stability of Einstein metrics.

Normal homogeneous spaces are a natural setting in which Casimir operators occur. In the 80s, Koiso studied the stability of symmetric spaces of compact type, utilizing the coincidence of Δ_L with a Casimir operator. Motivated by his and also the G-stability results of Lauret-Lauret-Will, we generalize Koiso's strategy to general normal homogeneous spaces.

Ultimately this approach is sufficient to provide many new non-symmetric examples of stable Einstein manifolds of positive scalar curvature.

Uwe Semmelmann (Stuttgart)
Kähler manifolds of non-negative curvature
In my talk I will present a new and rather short proof of an old theorem of A. Gray stating that Kähler manifolds of non-negative sectional curvature and constant scalar curvature are locally symmetric. The talk is based on discussions with Gregor Weingart.

Wilderich Tuschmann (Karlsruhe)
Rigidity, Stability, and Reconstruction
Starting from sphere theorems in positive curvature, I will address questions and results about rigidity and stability and then turn to 'what we do in the shadows', namely, describe how these interfere with tasks in geometric data analysis concerning reconstruction problems for Riemannian manifolds and Alexandrov spaces.

Ruobing Zhang (Princeton)
Metric geometry of Einstein 4- manifolds: recent progress and open questions
The studies of degenerating Einstein manifolds have been very active during the past three decades. Compared with rather complete understandings in the volume non-collapsing case, due to substantial challenges and fundamental difficulties, the geometry of collapsing Einstein manifolds is much less explored while its applications are being widely demanded in different disciplines of geometry and physics.

Intensive investigations focus on the collapsing Einstein 4-manifolds with special holonomy in the recent years. This talk will exhibit major progress by different research groups in the field, which can be regarded as an important step towards the direction of studying the general case. We will also propose open questions (some of them are folklore).