

ANALYSIS, GEOMETRY AND TOPOLOGY OF POSITIVE SCALAR CURVATURE METRICS: ABSTRACT FOR MFO-WORKSHOP

1. ORGANIZERS

- Bernd Ammann, Fakultät für Mathematik, Universität Regensburg, 93040 Regensburg, Germany. bernd.ammann@mathematik.uni-regensburg.de
- Bernhard Hanke, Mathematisches Institut, Universität Augsburg, 86135 Augsburg, Germany. hanke@math.uni-augsburg.de
- Anna Sakovich, Department of Mathematics, Uppsala University, 75106 Uppsala, Sweden. anna.sakovich@math.uu.se

2. ABSTRACT

One of the fundamental goals in differential geometry is to understand the relationship between (local) geometric and (global) topological properties of smooth manifolds. Scalar curvature measures the growth rates of small balls in Riemannian manifolds and leads to interesting global questions: what functions arise as scalar curvature functions of complete metrics on a given manifold? What happens under certain boundary conditions, e.g., for totally geodesic or mean convex boundary? Can we define scalar curvature for metrics with lower regularity or on singular spaces?

Scalar curvature geometry gains its attraction by combining ideas, methods, and results from different areas of modern geometry: Riemannian geometry, global analysis, geometric topology, noncommutative geometry, Lorentzian geometry, general relativity, conformal geometry. Particularly intriguing is the presence of two seemingly unrelated approaches to fundamental questions in the field: spectral geometry of Dirac operators on the one hand, and global variational methods for exploring the existence and properties of minimal hypersurfaces on the other. On the one hand, this guarantees a fruitful flow of ideas that crosses the classical boundaries of different disciplines. On the other hand, it is an increasing challenge to keep track of the ramifications of the subject and to identify its structural pillars in terms of problems, methods and results.

The latter aspect has become more urgent after the abundance of open problems and ideas collected in Gromov's recent work, especially in his 2019 *Four lectures on scalar curvature*, which will remain a main source of inspiration in this area.

In this workshop, researchers from diverse backgrounds will share ideas along these main directions, but also provide opportunities to explore smaller side paths and foster tremendous creativity in the field.