Shanks Workshop on Geometric Analysis Titles & Abstracts

Michael Anderson (Stony Brook University)
Title: Boundary value problems for Einstein metrics and a conjecture of Bartnik.
Abstract: We will discuss elliptic boundary value problems for the Einstein equations and then report on recent progress on the global solvability of one of the simplest such boundary value problems. Namely find exterior solutions to the static vacuum Einstein equations with prescribed metric and mean curvature on a boundary 2-sphere. This gives a partial resolution of a conjecture of R. Bartnik, important for certain notions of quasi-local mass in general relativity.

Bianca Santoro (CUNY-City College of NY)
Title: Bifurcation of periodic solutions to the singular Yamabe problem on spheres.
Abstract: In this talk, we describe how to obtain uncountably many periodic solutions to the singular Yamabe problem on a round sphere, that blow up along a great circle. These are complete constant scalar curvature metrics on the complement of S^1 inside S^m, $m \geq 5$, conformal to the round metric and periodic in the sense of being invariant under a discrete group of conformal transformations. These solutions come from bifurcating branches of constant scalar curvature metrics on compact quotients of $S^m \backslash S^1$. This is a joint work with R. Bettiol (UPenn) and P. Piccione (USP-Brazil).

Michael Lock (University of Texas Austin)
Title: Special Hermitian metrics as characterized by relationships of scalar curvatures.
Abstract: On a Kähler manifold there is a clear connection between the complex geometry and underlying Riemannian geometry. In some ways, this can be used to characterize the Kähler condition. While such a link is not as clear in the non-Kähler setting, one can seek to understand these characterizations as specific instantiations of a more general class. I will address such questions from the perspective of relationships between the Chern and Riemannian scalar curvatures. This is joint work with Michael Dabkowski.

Jie Qing (University of California Santa Cruz)
Title: Convexity and embeddedness for hypersurfaces in hyperbolic space.
Abstract: This is a report on my joint work with Vincent Bonini and Shiguang Ma. Using the so-called horospherical metrics for immersed hypersurfaces with certain convexity in hyperbolic space, we present a proof for the conjecture (Alexander-Currier) that, except covering maps of equip-distance surfaces in hyperbolic 3-space, a complete, immersed, nonnegatively curved hypersurface in hyperbolic space is always embedded with at most two point boundary at infinity.

Boris Botvinnik (University of Oregon)
Title: Topology of the space of metrics of positive scalar curvature.
Abstract: We use recent results on the moduli spaces of manifolds, relevant index and surgery theory to study the index-difference map from the space $\mathcal{R}iem^+(W^d)$ of psc-metrics to the space $\Omega^{d+1}KO$ representing the real K-theory. In particular, we show that the index map induces nontrivial homomorphism in homotopy groups $\pi_k \mathcal{R}iem^+(W^d) \to \pi_k \Omega^{d+1}KO$ once the target groups $\pi_k \Omega^{d+1}KO = KO_{k+d+1}$ are not trivial. This work is joint with J.Ebert and O. Randall-Williams.

Ken Knox (University of Tennessee at Knoxville)
Title: Quantitative regularity estimates on manifolds with boundary under integral curvature bounds.
Abstract: In this talk we will discuss some new quantitative regularity estimates for Riemannian manifolds with boundary that come from control over integral norms of various curvature quantities. This leads to a collection of compactness theorems and related stability results.