"QUINZENA DE GEOMETRIA"

Dragomir Tsonev (UFAM, Manaus)
Title: ON THE SPECTRA OF GEOMETRIC OPERATORS EVOLVING WITH GEOMETRIC FLOWS
Abstract: In this work we generalise various recent results on the evolu- tion and monotonicity of the eigenvalues of certain geometric operators under specified geometric flows. Given a compact Riemannian manifold $(M^n, g(t))$ and a smooth function $\eta \in C^\infty(M)$ we consider the family of operators $\Delta - g(\nabla\eta, \nabla\cdot) + cR$ where R is the scalar curvature and c is some real con- stant. We define a geometric flow on M which encompasses the Ricci, the Ricci - Bourguignon and the Yamabe flows. Supposing that the metric $g(t)$ evolves along this general geometric flow we first derive a formula for the evolution of the eigenvalues $\lambda(t)$. Moreover, under certain restrictions on the afore- mentioned flow as well some curvature assumptions, we prove a monotonicity results for the eigenvalues of both the Witten Laplacian $\Delta - g(\nabla\eta, \nabla\cdot)$ and the more general operator $\Delta - g(\nabla\eta, \nabla\cdot) + cR$. We also derive Bocher and Reilly type formulas for the latter operator and, assuming that the manifold M is closed, an estimate for $\lambda(t)$ is given.

Ezequiel Barbosa (UFMG, Belo Horizonte)
Title: ON STABLE CMC FREE-BOUNDARY SURFACES IN A STRICTLY CONVEX DOMAIN OF A BI-INVARIANT LIE GROUP
Abstract: Let G be a three-dimensional Lie group with a bi-invariant metric. Consider $\Omega \subset G$ a strictly convex domain in G. We prove that If $\Sigma \subset \Omega$ is a stable CMC free-boundary surface in Ω then Σ has genus either 0 or 1, and at most 3 boundary components. This result was proved by Ros-Vergasta for the case where $G = \mathbb{R}^3$, and slightly improved by I. Nunes, who showed that the genus 1 case doesn't occur, and also proved by R. Souam for the case where $G = \mathbb{S}^3$ and Ω is a geodesic ball with radius $r < \frac{\pi}{2}$, excluding the possibility of Σ having 3 boundary components. Besides $\mathbb{R}^3$ and $\mathbb{S}^3$, our result also apply to the spaces $\mathbb{S}^1 \times \mathbb{S}^1 \times \mathbb{S}^1$, $\mathbb{S}^1 \times \mathbb{R}^2$, $\mathbb{S}^1 \times \mathbb{S}^1 \times \mathbb{R}$ and $SO(3)$. When $G = \mathbb{S}^3$ and Ω is a geodesic ball with radius $r < \frac{\pi}{2}$, we obtain that Σ is a totally umbilical disc.

Gregório Pacelli Bessa (UFC, Fortaleza)
Title: ON THE RADIAL SPECTRUM OF GEODESIC BALLS IN MODEL MANIFOLDS.
Abstract: We consider a geodesic ball $B(r)$ centered at the origin of a model manifold. Its spectrum $\sigma(B(r))$ can be decomposed as a union of subsets $\sigma_i(B(r))$ associated to the eigenvalue of the sphere ν_i, $i = 0, 1, ...$ The radial eigenvalues are the elements of $\sigma_0(B(r))$. We prove that

$$\sum_{\lambda \in \sigma_0(B(r))} \frac{1}{\lambda} = \int_{B(r)} \frac{Vol(\partial B(s))}{Vol(B(s))} ds$$

We also discuss other related topics.

Henrique Bursztyn (IMPA, Rio de Janeiro)
Title: DIRAC STRUCTURES AND POISSON HOMOGENEOUS SPACES
Abstract: The talk will describe an application of the theory of Dirac structures, which are geometric objects extending Poisson as well as presymplectic structures that play a central role in "generalized geometry". I will explain how Dirac structures can be used as a tool to solve the problem of integrating Poisson homogeneous spaces.

Henrique Sá Earp (Unicamp, Campinas)
Title: GAUGE THEORY AND G_2-GEOMETRY ON CALABI-YAU LINKS
Abstract: The 7-dimensional link K of a weighted homogeneous hypersurface on the round 9-sphere in $\mathbb{C}^5$ has a nontrivial null Sasakian structure which is contact Calabi-Yau, in many cases. It admits

a canonical co-closed G_2-structure ϕ induced by the Calabi-Yau 3-orbifold basic geometry. We distinguish these pairs (K, ϕ) by the Crowley-Nordström $\mathbb{Z}_{48}$-valued ν-invariant, for which we prove odd parity and provide an algorithmic formula. We describe moreover a natural Yang-Mills theory on such spaces, with many important features of the torsion-free case, such as a Chern-Simons formalism and topological energy bounds. In fact compatible G_2-instantons on holomorphic Sasakian bundles over K are exactly the transversely Hermitian Yang-Mills connections.

Joa Weber (Unicamp, Campinas)
Title: CONLEY PAIRS AND GEOMETRY - SOME EXAMPLES
Abstract: We shall advocate the use of certain Conley pairs associated to non-degenerate, or at least isolated, critical points as effective tools in geometry. Applications include the construction of Morse filtrations associated to semi-flows, a new proof of the cell attachment theorem in Morse theory, and a constructive proof of the folklore lemma that there is an open contractible thickening of the unstable manifold of an isolated critical point. The latter immediately implies the Lusternik-Schnirelmann category theorem.

Jose Espinar (IMPA, Rio de Janeiro)
Title: ON A FULLY NONLINEAR VERSION OF THE MIN-OO CONJECTURE
Abstract: In this talk, we prove that the Min-Oo's conjecture holds if we consider a compact connected locally conformally flat manifold with boundary such that the eigenvalues of the Schouten tensor satisfy a fully nonlinear elliptic inequality, and the mean curvature of the boundary is controled below by the mean curvature of a geodesic ball in the standard unit-sphere. This is a joint work with E. Barbosa and M.P. Cavalcante.

Paolo Piccione (USP, São Paulo)
Title: TEICHMÜLLER THEORY AND COLLAPSE OF FLAT MANIFOLDS.
Abstract: I will describe the Teichmüller space of flat metrics on a compact manifold, and the boundary of this space, which consists of (isometry classes) of flat orbifolds obtained by collapse. The Teichmüller space is described in terms of the isotypic components of the holonomy representation. I will prove that every compact flat orbifold can be obtained by collapsing flat metrics on some compact Bieberbach manifold. An application to the Yamabe problem on noncompact manifold will also be discussed. This is a joint work with R. Bettiol (UPenn) and A. Derdzinski (OSU).

Roberto Rubio (IMPA, Rio de Janeiro)
Title: IMPA
Abstract:

Sérgio Almaraz (UFF, Niterói)
Title: FLUXOS CONFORMES EM VARIEDADES COM BORDO
Abstract: Discutirei dois teoremas de convergência de fluxos conformes para variedades Riemannianas compactas com bordo, ambas similares ao fluxo de Yamabe para variedades fechadas. Um dos teoremas é um trabalho conjunto com L. Sun.