Workshop on Submanifold Theory and Geometric Analysis

UFSCar, São Carlos, Brazil, August 05 – 09, 2019

Wednesday- 8h - 8:50h -Auditório do DM

Yunelsy Nápoles Alvares

(IME/USP, Brazil)

PDE and hypersurfaces with prescribed mean curvature

Abstract. Minicourse 1

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Workshop on Submanifold Theory and Geometric Analysis

UFSCar, São Carlos, Brazil, August 05 – 09, 2019

Wednesday- 9h - 9:50h -Auditório do DM

Marcos Petrúcio Cavalcante

(UFAL - Brazil)

Lower bounds for the stability index of constant mean curvature surfaces

Abstract. We prove that the stability index of a compact constant mean curvature (CMC) surface in the Euclidean space or in the unit sphere is bounded from below by a linear function of its genus. We also will discuss some results in the case of free-boundary CMC surfaces in a mean convex body of $\mathbb{R}^3$. These results are part of joint works with Darlan de Oliveira.

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Wednesday- 10:30h - 11:20h -Auditório do DM

Dirk Töben

(UFSCar - Brazil)

Riemannian Foliations with Positive Curvature

Abstract. A foliation is called Riemannian if its leaves are locally equidistant. We consider Riemannian foliations with positive (transverse) sectional curvature. In the simple case that all leaves are closed, the leaf space is a Riemannian orbifold inheriting the positive curvature from the foliation, whereas in the presence of non-closed leaves the leaf space is not even Hausdorff. In this talk we consider the other extreme case, in which there is a non-closed leaf whose closure is of maximal dimension. We then show that the ambient manifold fibers over a finite quotient of a sphere or a weighted complex projective space. We also show that all leaves of a Riemannian foliation of a compact manifold with finite fundamental group and nonvanishing Euler characteristic are closed. This is a joint work with Francisco Caramello. These results are part of joint works with Darlan de Oliveira.

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Wednesday- 11:30h - 12h -Auditório do DM

Adriano Cavalcante Bezerra

(IFG - Brazil)

Rigidity of Submanifolds in a Constant Curvature Space

Abstract. Let M be a complete submanifold with constant mean curvature immersed in a given space of constant curvature. Our objective is to present some condition on first eigenvalue of Laplacian or stability condition to obtain rigidity results on immersion. We will show when an immersion is totally geodesic in a hyperbolic space, or when it's isometric to some space form in a Lorentz space. We will also obtain some estimates for the first eigenvalue of the super stability operator for a surface minimally immersed in the hyperbolic space.

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Wednesday- 14h - 14:50h -Auditório do DM

Paolo Piccione

(USP - Brazil)

Collapse of compact flat manifolds and the Yamabe problem

Abstract. The study of solutions for the Yamabe problem in certain noncompact manifolds leads naturally to the question of existence of collapse for compact flat manifolds. In this talk I will present some recent results, obtained in collaboration with R. Bettiol (CUNY), A. Derdzinski (OSU) and R. Mossa (USP), on the moduli space of flat metrics of a compact manifold, and its boundary. In particular, I will discuss the flat collapse along a holonomy invariant subspace, and describe it in terms of the associated parallel flat foliation.

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Wednesday- 15h - 15:30h -Auditório do DM

Allan Freitas

(UFPB - Brazil)

Volume comparison and Gap Results on the n-dimensional sphere

Abstract. A result showed by M. Gursky ensures that any metric g on the 4-dimensional sphere $\mathbb{S}^4$ satisfying $Ric_g = 3g$ and $inj_g(\mathbb{S}^4) \geq \frac{\pi}{\sqrt[4]{3}}$ is isometric to the round metric. In this talk, we will discuss on that there exists a universal number i_0 such that any metric g on the 4-dimensional sphere $\mathbb{S}^4$ satisfying $Ric_g = 3g$ and $inj_g(\mathbb{S}^4) \geq \frac{\pi}{\sqrt[4]{3}} - i_0$ is isometric to the round metric. Furthermore, there exists a universal $\varepsilon_0 > 0$ such that any metric g on the 4-dimensional sphere $\mathbb{S}^4$ with nonnegative sectional curvature, $Ric_g = 3g$ and $\frac{8}{9}\pi^2 - \varepsilon_0 \leq Vol(\mathbb{S}^4, g)$ is isometric to the round metric. We will also use this volume comparison theorem, in addition to Bishop's volume comparison theorem, to address rigidity results on static metrics.

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Workshop on Submanifold Theory and Geometric Analysis

UFSCar, São Carlos, Brazil, August 05 – 09, 2019

Wednesday- 16h - 16:50h -Auditório do DM

Marcos M. Alexandrino

(USP - Brazil)

Mean curvature flow of orbits of isometric actions

Abstract. Given a proper isometric action on a compact manifold, we study the mean curvature flow equation with a principal orbit of this action as initial datum. We prove that any finite time singularity is a singular orbit, and the singularity is of type I. These results are proved in the more general context of Singular Riemannian foliations and generalize previous results of Liu and Terng, Pacini and Koike. This talk is based on a joint work with Prof. Marco Radeschi (Notre Dame) and is aimed at a broad audience of students, faculties and researchers.

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Wednesday- 17h - 17:50h -Auditório do DM

Francisco C. Caramello Jr.

(IME/USP, Brazil)

Introduction to Orbifolds

Abstract. These are course notes, intended to survey the basics of orbifold theory, for the mini-course "Introduction to Orbifolds" held on the Workshop on Submanifold Theory and Geometric Analysis at Federal University of São Carlos, Brazil (August 05 – 09, 2019). We introduce orbifolds, relating them with group actions, then we see how elementary objects from Algebraic Topology generalize to orbifolds, such as the fundamental group and Euler characteristic, then we proceed to the generalizations of classical objects from Differential Geometry to orbifolds, studding orbibundles, differential forms, integration and De Rham cohomology, and finally we endow orbifolds with Riemannian metrics and survey some generalizations of classical results from Riemannian Geometry to this setting.

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