Geometric Analysis
Analyse géométrique
(Org: **Pengfei Guan** (McGill University) and/et **Fernando Coda Marques** (Princeton University))

SERGIO ALMARAZ, Universidade Federal Fluminense (Brazil)
On Yamabe type problems on manifolds with boundary

The Yamabe problem on compact manifolds with boundary was proposed by Escobar in 1992. Since then, related questions on conformal deformations of Riemannian metrics on those manifolds have been raised, such as the compactness of the set of solutions and conformal flows. In this talk I will give a brief overview of results concerning those questions.

JOSE ESPINAR, IMPA
Fully nonlinear version of the Min-Oo Conjecture

In this talk, we show rigidity results for super-solutions to fully nonlinear elliptic conformally invariant equations in subdomains of the standard n-sphere $\mathbb{S}^n$ under suitable conditions on the boundary.

This proves rigidity for compact connected locally conformally flat manifolds (M, g) with boundary such that the eigenvalues of the Schouten tensor satisfy a fully nonlinear elliptic inequality and whose boundary is isometric to a geodesic sphere $\partial D(r)$, $D(r)$ a geodesic ball of radius $r \in (0, \pi/2]$ in $\mathbb{S}^n$, and totally umbilic with mean curvature bounded bellow by the mean curvature of this geodesic sphere. Under the above conditions, (M, g) must be isometric to the closed geodesic ball $\overline{D(r)}$. In particular, we recover the solution by F.M. Spiegel to the Min-Oo conjecture for locally conformally flat manifolds.

As a side product, our methods in dimension 2 provide a new proof to a classical theorem of Toponogov. Roughly speaking, Toponogov's Theorem is equivalent to a rigidity theorem for spherical caps in the Hyperbolic three-space $\mathbb{H}^3$.

This is a joint work with E. Barbosa and M.P. Cavalcante.

AILANA FRASER, University of British Columbia
Minimal submanifolds in manifolds of nonnegative Ricci curvature

I will discuss a dichotomy for minimal submanifolds in manifolds of nonnegative Ricci curvature, a generalization to mean convex hypersurfaces in manifolds with Ricci curvature bounded from below, and applications. This is joint work with Jaigyoung Choe.

DAN KETOVER, Princeton University
Free boundary minimal surfaces of unbounded genus

Free boundary minimal surfaces are natural variational objects that have been studied since the 40s. In spite of this, very few explicit examples in the simplest case of the round three ball are known. I will describe how variational methods can be used to construct new examples with unbounded genus resembling a desingularization of the critical catenoid and flat disk. I'll also give a new variational interpretation of the previously known examples.

SIYUAN LU, McGill University
Isometric embedding and quasi-local type inequality

In this talk, we will first review the classic Weyl's embedding problem and its applications in quasi-local mass. We will discuss recent progress on Weyl's embedding problem in Riemannian manifold. By assuming isometric embedding into Schwarzschild manifold, we establish a quasi-local type inequality. Part of the work are joint with Pengfei Guan and Pengzi Miao.

DAVI MAXIMO, University of Pennsylvania, USA
On Morse index estimates for minimal surfaces

In this talk we will survey some recent estimates involving the Morse index and the topology of minimal surfaces

LU WANG, University of Wisconsin-Madison
Asymptotic structure of self-shrinkers of mean curvature flow

Self-shrinkers are a special class of solutions to mean curvature flow and they are singularity models for the flow. In this talk, I will show that each end of a noncompact self-shrinker in $\mathbb{R}^3$ of finite topology must be smoothly asymptotic at infinity to a regular cone or a round cylinder.

XIN ZHOU, University of California, Santa Barbara
Min-max minimal hypersurfaces with free boundary

I will present a joint work with Martin Li. Minimal surfaces with free boundary are natural critical points of the area functional in compact smooth manifolds with boundary. In this talk, I will describe a general existence theory for minimal surfaces with free boundary. In particular, I will show the existence of a smooth embedded minimal hypersurface with free boundary in any compact smooth Euclidean domain. The minimal surfaces with free boundary were constructed using the min-max method. I will explain the basic ideas behind the min-max theory as well as our new contributions.