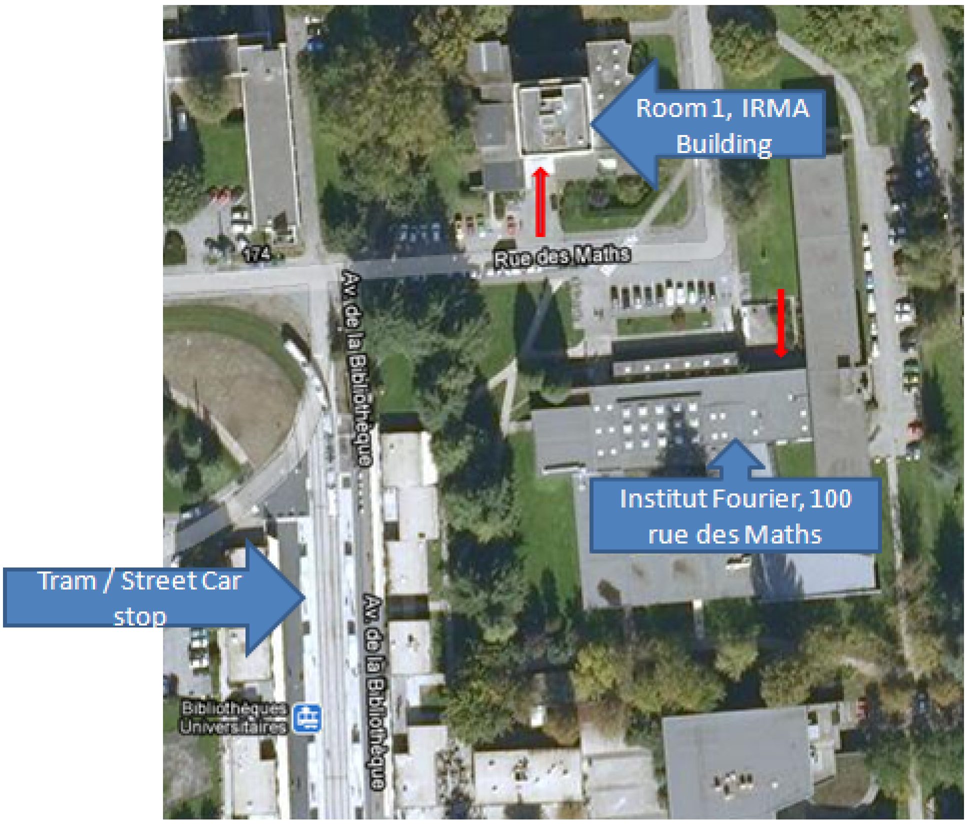
Workshop "Geometric analysis, II" - Grenoble 5-9 September 2011
Programme (tentative)
Conferences will be held: Salle 01 / Room 1 - Tour IRMA*

(Tour IRMA / IRMA building : across the street from Institut Fourier, map below)

Day/Hour	09h00 10h00	10h30 11h30		At 14h15 30 mn lectures	15h00 16h00	16h30 17h30
Monday	10h Welcome	Daniel			Zheng	Setti
Tuesday	Rigoli	Hauswirth		Menezes	Coda	Lira
Wednesday	Pigola	Hauswirth		Cavalcante	Coda	Zhou
Thursday	Castillon	Hauswirth			Coda	Ramos
Friday	Devyver	Pacard		xxxxxx	xxxxxx	xxxxxx

Mini-course



Geometric Analysis 2

Institut Fourier, Grenoble

Sept. 5–9, 2011

Philippe Castillon, Université de Montpellier (France)

Asymptotically harmonic manifolds of negative curvature

Abstract. Harmonic manifolds are those Riemannian manifolds whose harmonic functions satisfy the mean value property, or equivalently, whose geodesic spheres have constant mean curvature. In several studies of these manifolds an asymptotic version of harmonicity naturally appears (introduced by F. Ledrappier) : asymptotically harmonic manifolds are those Riemannian manifolds whose horospheres have constant mean curvature.
Asymptotically harmonic manifolds where mainly studied in the cocompact and homogenous cases. In this talk we shall see that in the general case, asymptotic harmonicity provides a lot of information on the asymptotic geometry of the manifold. In paricular, we shall give a caracterisation of asymptotic harmonicity in term of the asymptotic behaviour of the volume form. This talk is based on a joint work with Andrea Sambusetti.

Marcos P. Cavalcante, Universidade Federal de Alagoas (Brazil)

On L^2-harmonic forms on complete submanifolds of the Euclidean space with finite total curvature

Abstract. Let M^n be a complete submanifold of the Euclidean space $\mathbb{R}^N$ and let $|\Phi|$ denote the length of the traceless second fundamental form of M. In this talk we will use the Moser iteration method to show that if $||\Phi||_{L^n(M)} < \infty$ then, the space of L^2-harmonic on M has finite dimension. Futhermore, we will show that there exists a positive constant $\epsilon(n)$ such that if $||\Phi||_{L^n(M)} < \epsilon(n)$, then there is no non trivial L^2- harmonic form on M. These results are part of a joint work with H. Mirandola and F. Vitorio.

Fernando Codá Marques, IMPA, Rio de Janeiro (Brazil)

Scalar curvature : rigidity and nonrigidity problems

Abstract. In these lectures I will discuss some recent rigidity and nonrigidity theorems for manifolds with lower bounded scalar curvature. These results are reminiscent of the celebrated Positive Mass Theorem from General Relativity, and some relate to minimal surfaces and Ricci flow. We also plan to describe the construction of the counterexamples to Min-Oo's Conjecture for the hemisphere.

Benoît Daniel, Université de Nancy (France)

Half-space theorems for minimal surfaces in homogeneous manifolds

Abstract. Half-space theorems aim to classify pairs of properly immersed minimal surfaces that do not intersect. For instance Hoffman and Meeks' theorem states that in R^3 such a pair must be a pair of parallel planes. We will talk about some half-space theorems when the ambient manifold is a homogeneous 3-manifold, in particular the Heisenberg group.

Baptiste Devyver, Université de Nantes (France)

Finiteness of the Morse index of Schrödinger operators

Abstract. The study of Schrödinger operators on manifolds is an interesting question for both the geometric and the analytic point of view. In this talk, we are interested in the following problem : when does a Schrödinger operator has a finite negative spectrum ? This has a link, for example, with the stability of minimal surfaces.

Laurent Hauswirth, Université de Marne-la-Vallée (France)

Geometry of minimal surfaces in $S^2 \times R$

Abstract. In this mini-course, I will describe the moduli space of minimal annuli properly embedded in $S^2 \times R$. By integrable system method, any embedded annulus in $S^2 \times R$ can be continuously deformed into a geodesic $\times R$. This deformation characterizes the geometry of minimal embedded annuli in $S^2 \times R$.

Jorge Lira, Universidade Federal do Ceará, Fortaleza (Brasil)

Graphs with prescribed curvature in Riemannian manifolds

Abstract. We discuss some recent results about the existence of graphs in Riemannian manifolds for which we prescribe a given function of the principal curvatures. If time permits we also present some existence theorems for graphs with prescribed anisotropic mean curvature.

Ana Maria Menezes de Jesus, IMPA (Brazil)

The Alexandrov problem in a quotient space of $\mathbb{H}^2 \times \mathbb{R}$

Abstract. In this talk, we will prove an Alexandrov type theorem for a quotient space of $\mathbb{H}^2 \times \mathbb{R}$. More precisely, we will classify the compact embedded surfaces with constant mean curvature in the quotient of $\mathbb{H}^2 \times \mathbb{R}$ by a subgroup of isometries generated by a parabolic translation along horocycles of $\mathbb{H}^2$ and a vertical translation. Moreover, we will construct some examples of periodic minimal surfaces in $\mathbb{H}^2 \times \mathbb{R}$.

Frank Pacard, École Polytechnique, Palaiseau (France)

Minimal cones and stable solutions for the Allen-Cahn equation

Abstract. I will review some recent results about the existence of entire solutions of the Allen-Cahn equation in Euclidean space and their relation with minimal surfaces. In particular, I will focus on the relationship between stable minimal cones and the existence of stable solutions for the Allen-Cahn equation.

Stefano Pigola, Università degli Studi dell'Insubria, Como (Italy)

Geometric aspects of the p-Laplacian on Riemannian manifolds

Abstract. The p-Laplacian appears naturally in connection with geometric problems concerning with e.g. the homotopy class of finite energy maps, the comparison theory for their "canonical" representatives, the L^p-cohomology, the metric rigidity and the topology at infinity of manifolds supporting a Sobolev inequality. In this talk we will take a look at some of them.

Daniel Ramos, Universitat Autònoma de Barcelona (Spain)

Smoothening cone points with Ricci flow

Abstract. We consider 2-dimensional Ricci flow on a closed surface with cone points. Our main result is : given a cone metric g_0 over a (nonsmooth) closed surface there is a smooth Ricci flow $g(t)$ defined for $(0, T]$, with unbounded curvature, such that $g(t)$ tends to g_0 as $t \to 0$. This result means that Ricci flow provides a way for instantaneously smoothening cone points. Our work was inspired by an argument of P. Topping for Ricci flow on cusps of negative curvature.

Marco Rigoli, Università di Milano (Italy)

A generalization of Calabi compactness result

Abstract. Calabi compactness result is ,probably ,the first serious extension of the classical work of Bonnet And Myers, however it still requires that the Ricci tensor be non negative. Our main result is to extend this theorem even when the Ricci tensor is unbounded from below.

Alberto Setti, Università degli Studi dell'Insubria, Como (Italy)

Stochastic properties of Riemannian manifolds and application to PDEs

Abstract. The asymptotic behavior of the heat kernel of a Riemannian manifold gives rise to the classical concepts of parabolicity, stochastic completeness (or conservative property) and Feller property (or C^0-diffusion property).
Both parabolicity and stochastic completeness have been the subject of a systematic study, which led to discovering sharp geometric conditions for their validity and to a rich array of tools, techniques and equivalent concepts ranging from maximum principles at infinity, function theoretic tests (Khas'minskii criterion), comparison techniques etc.... We aim at describing a number of steps forward in the development of a similar apparatus for the Feller property, and to present a number of applications of the Feller property to the asymptotic behavior of PDE's on the manifold.

Kai Zheng, **Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing (China) and Institut Fourier, Grenoble (France)**

The geodesics in the space of Kähler metrics with cone singularities

Abstract. This talk is about the Kähler metrics with cone singularities. We will discuss the existence of $C^{1,1}$ geodesics in the space of the Kähler metrics with cone singularities. It is a generalization of Chen's $C^{1,1}$ geodesics for the smooth metrics. This is a joint work with Simone Calamai.

Detang Zhou, **Universidade Federal Fluminense, Niteroi (Brazil)**

Properness of self-shrinker for mean curvature flow

Abstract. We derive a precise estimate on the volume growth of the level set of a potential function on a complete noncompact Riemannian manifold. As applications, we obtain the volume growth rate of a complete noncompact self-shrinker and a gradient shrinking Ricci soliton. We also prove the equivalence of weighted volume finiteness, polynomial volume growth and properness of an immersed self-shrinker in Euclidean space. This is a joint work with X. Cheng.