Short talks

Clément Debin, *A convergence theorem for metrics with Bounded Integral Curvature*

Abstract: In this talk, we look for a compactification of the space of Riemannian metrics with conical singularities, on a fixed compact surface. The accumulation of cone points (along a curve, or along a more complicated set) naturally leads to the study of metrics with Bounded Integral Curvature (B.I.C.). This theory of singular surfaces was developed in Leningrad, between the 40's and the 70's, by Alexandrov and many others. These are intrisic metrics, for which there is a natural notion of curvature, which is a Radon measure. This includes Riemannian metrics (possibly with conical singularities), as well as Alexandrov spaces of curvature bounded by above, or by below. In this talk, by analogy with the classical Cheeger-Gromov's compactness theorem, we prove a compactness theorem for metrics with B.I.C. ; as a corollary, we obtain a compactification of the space of Riemannian metrics with conical singularities.

Baptiste Devyver, *Heat kernel estimates for the Laplacian: from functions to forms*

Abstract: Heat kernel estimates for the scalar Laplacian have been extensively investigated in the past thirty years: a seminal work of P. Li and S.T. Yau shows that if the Ricci curvature is non-negative, then the heat kernel of the scalar Laplacian has Gaussian estimates. Later on, A. Grigoryan and L. Saloff-Coste weakened the hypothesis of non-negativity of the Ricci curvature, replacing it by the validity of some functional inequalities bearing an isoperimetric flavor. Recently, there has been an increased interest to prove similar results for the Hodge Laplacian, acting on differential forms. In this talk, I will present a new result, obtained in collaboration with T. Coulhon and A. Sikora: in the general framework considered by Saloff-Coste and Grigoryan, one can obtain a Gaussian estimate for the heat kernel of the Laplacian on forms, provided the curvature term in the Bochner formula is "small" at infinity and there are no non-zero L^p harmonic forms.

Esko Heinonen, *Asymptotic Dirichlet problem for minimal and f-minimal graphs on Cartan-Hadamard manifolds*

Abstract: Cartan-Hadamard manifolds can be compactified by adding a "sphere at infinity" and equipping the resulting space with the cone topology. The asymptotic Dirichlet problem for the minimal graph equation then asks if there exists a function satisfying the minimal graph equation inside the manifold and having prescribed boundary values at infinity. For f-minimal graphs the problem is essentially the same but now we want that the mean curvature of the graph depends on the given smooth function $f\colon M \times \mathbb{R} \to \mathbb{R}$.

The solvability of these problems depends on the geometry of the manifold and on the given function f. I will briefly introduce the cone topology and then discuss about the conditions known to guarantee the existence of solutions and about the methods used to prove the existence. The talk is based on joint works with J-B Casteras and I Holopainen.

Rami Luisto, *A characterization result for BLD-mappings in metric spaces*

Abstract Even thought mappings of Bounded Length Distortion were originally defined as a subclass of the so called quasiregular mappings, BLD-maps can also be thought as not locally homeomorphic generalizations of local L-bilipschitz mappings. Indeed, in this talk we will approach the theory of BLD-mappings between metric spaces by studying families of mappings whose locally homeomorphic representatives are local L-bilipschitz maps. As much as time permits, we will also discuss some of those results of BLD-mappings for which we need to assume that the mappings are defined between so called "generalized manifolds of type A". These spaces are a generalization of complete Riemannian manifolds (or complete Lipschitz manifolds) of bounded curvature. The need for them rises from the fact that many (local) equidistribution

results of BLD-mappings rely on topological index- and degree theory, which in turn rely on the (algebraic-) topological structure of euclidean spaces.

Ilaria Mondello, *Geometry and analysis on stratified spaces*

Abstract: Stratified spaces are singular metric spaces arising naturally in differential geometry as quotients or limits of smooth manifolds; they have also been studied from the topological and analytical points of view. This talk is devoted to show how to obtain in the singular setting some theorems which, restricted to the smooth case, recover classical results of Riemannian geometry and geometric analysis (Obata-Lichnerowicz and Myers diameter theorem, Sobolev inequalities...). Such theorems can also be applied in order to study the existence of a conformal metric of constant scalar curvature on a stratified space.

Raquel Perales, *Intrinsic Flat Convergence of Alexandrov Spaces*

Abstract: We study sequences of integral current spaces (X_j, d_j, T_j) with no boundary such that (X_j, d_j) are Alexandrov spaces with nonnegative curvature and diameter uniformly bounded from above and such that the integral current structure T_j has weight 1. We prove that for such sequences either they collapse or the Gromov-Hausdorff and Sormani-Wenger Intrinsic Flat limits agree. (Joint work with Nan Li).

Giuseppe Pipoli, *Inverse mean curvature flow in complex hyperbolic space*

Abstract: We consider the evolution by inverse mean curvature flow of closed star-shaped hypersurfaces in the complex hyperbolic space. Similar problems have already been studied for hypersurfaces of the Euclidean space or hyperbolic space. We will show that, like in the previous cases, the flow is defined for every positive time and the evolving hypersurface stays star-shaped. Moreover in our case a new phenomenon appears: the induced metric converges, up to a suitable rescaling, to a conformal multiple of the standard sub-Riemannian metric on the odd-dimensional sphere.

Teri Soultanis, *Existence of energy minimizers in homotopy classes of Newtonian maps between metric spaces*

Abstract: In the sixties Eells and Sampson studied existence of maps between manifolds that minimize the 2-energy in a given homotopy class (with nonpositively curved target). Korevaar and Schoen extended the existence to the case where the target is a metric space of nonpositive curvature in the nineties. In the talk I pursue an existence theory in the still wider setting where the domain is a metric space supporting a poincare inequality, and consider p-energies where $1 < p < \infty$.