TALKS

Martin FITZI, *Minimal surfaces of higher genus in metric spaces*

Abstract. The Plateau-Douglas problem asks to find an area minimizing surface of fixed genus spanning a given finite collection of Jordan curves in Euclidean space. Quite recently, Stefan Wenger and I solved this problem in the setting of proper metric spaces admitting a local quadratic isoperimetric inequality. Moreover, we obtained continuity up to the boundary and interior Hölder regularity of solutions. Our results generalize corresponding results of Jost and Tomi-Tromba from the setting of Riemannian manifolds to that of proper metric spaces with a local quadratic isoperimetric inequality. In this talk, I am going to present the main ideas behind the existence and regularity proofs in our article.

Silvia GHINASSI, *Smooth Reifenberg theorems for sets and measures*

Abstract. We provide geometric sufficient conditions for one-sided Reifenberg flat sets of any integer dimension in Euclidean space to be parametrized by a Lipschitz map with Hölder derivatives. The conditions use a Jones type square function and all statements are quantitative in that the Hölder and Lipschitz constants of the parametrizations depend on such a function. We use these results to prove sufficient conditions for higher order rectifiability of sets and measures. Key tools for the proof come from Guy David and Tatiana Toro's parametrization of Reifenberg flat sets (with holes) in the Hölder and Lipschitz categories.

Annina ISELI, *Thurston Maps with four post-critical points*

Abstract. A Thurston map is a branched covering map of the two-sphere whose postcritical set is finite. If a Thurston map is expanding, its dynamics induces a sequence of finer and finer tilings of the sphere and thereby yields a (possibly fractal) metric on the sphere. A result of Haïssinsky-Pilgrim (2009) and Bonk-Meyer (2017) relates the geometric properties of the induced metric to the analytic properties of the Thurston map. Namely, it states that the induced metric is quasisymmetrically equivalent to the chordal metric if and only if the expanding Thurston map is topologically conjugate to a rational map of the Riemann sphere. This result is particularly interesting in light of Thurston's characterization (1980ies) of rational maps in terms of Thurston obstructions.

In this talk, after recalling the concepts and results mentioned above, I will consider a specific family of expanding Thurston maps with four postcritical points that arises from Schwarz reflections on flapped pillows. This family illustrates some of the difficulties in finding conjugate rational maps for given Thurston maps. Moreover, it provides insight towards a combinatorial characterization of postcritically-finite rational maps.

Luquesio P. JORGE, *The Gauss map of complete surfaces into* $\mathbb{R}^3$

Abstract. The history of the set of missing points by Gauss map of a complete surface into $\mathbb{R}^3$ with finite total curvature and some applications.

Giuseppe PIPOLI, *Invariant translators of the Heisenberg group*

Abstract. Translating solutions to the mean curvature flow are special hypersurfaces that move under mean curvature flow preserving their shape and translating in a fixed direction. They have a crucial role in understanding the singularities of the flow and provide interesting explicit examples of solutions. In this talk we present the construction of infinitely many new translating surfaces in the Heisenberg group. We discuss similarities and differences with the analogous examples in the Euclidean space.

Alberto RONCORONI, *Symmetry results for critical p-Laplace equations*

Abstract. We consider the following critical p-Laplace equation:

$$\Delta_p u + u^{p^*-1} = 0 \quad \text{in } \mathbb{R}^n \tag{1}$$

with $n \geq 2$ and $1 < p < n$. Equation (1) has been largely studied in the PDE's and geometric analysis' communities, since extremals of Sobolev inequality solve (1) and, for $p = 2$, the equation is related to the Yamabe's problem. In particular it has been recently shown, exploiting the moving planes method, that positive solutions to (1) such that $u \in L^{p^*}(\mathbb{R}^n)$ and $\nabla u \in L^p(\mathbb{R}^n)$ can be completely classified. Since the moving plane method strongly relies on the symmetries of the equation and of the domain, in the seminar a new approach to this problem will be presented. In particular this approach gives a complete classification of the solutions in an anisotropic setting. More precisely, we characterize solutions to the critical p-Laplace equation induced by a smooth norm inside any convex cone.

This is a joint work with G. Ciraolo and A. Figalli.

Keomkyo SEO, *Necessary conditions and nonexistence results for connected submanifolds*

Abstract. In 1930s, Douglas and Radó independently proved that any simple closed curve in a Euclidean space bounds at least one minimal disk. However, for any given two disjoint simple closed curves, we cannot guarantee existence of a compact connected minimal surface spanning such boundary curves in general. From this point of view, it is interesting to give a quantitative description for necessary conditions on the boundary of compact connected minimal surfaces. We derive density estimates for submanifolds with variable mean curvature in a Riemannian manifold with sectional curvature bounded above by a constant. This leads to distance estimates for the boundaries of compact connected sub- manifolds. As applications, we give several necessary conditions and nonexistence results for compact connected minimal submanifolds, Bryant surfaces, and surfaces with small L^2 norm of the mean curvature vector in a Riemannian manifold.

Darya SUKHOREBSKA, *Simple closed geodesics on regular tetrahedra in Lobachevsky space*

Abstract. It was obtained a complete classification of simple closed geodesics on regular tetrahedra in Lobachevsky space. It was evaluated the number of simple closed geodesics of length not greater than L and found the asymptotic of this number as L goes to infinity.