Paul Biran

Title: **Lagrangian Topology and Cobordisms**

Abstract: In this series of four lectures we will survey recent developments in the study of Lagrangian submanifolds via the recent theory of Lagrangian cobordism. We will go first over Lagrangian Floer theory and Fukaya categories. We will then explain the formalism of Lagrangian cobordism and its relation to the Fukaya category. We will try to cover several "down to earth" applications of the theory along the way. The lectures are largely based on a series of joint works with Octav Cornea.

Alexandru Oancea

Title: **Structure and applications of symplectic homology**

Abstract: Symplectic homology is a deformation invariant of Liouville domains, i.e. exact symplectic manifolds with convex boundary. Based on joint work with Kai Cieliebak, I will explain in what sense it has the structure of a homology theory *à la* Eilenberg and Steenrod. For that purpose it is convenient to extend the definition to Liouville cobordisms, and more generally to pairs of Liouville cobordisms. The main property of the resulting theory is the long exact sequence of a pair of Liouville cobordisms. This formalism encompasses most of the linear homology theories defined in terms of pseudoholomorphic curves for exact symplectic manifolds (Rabinowitz-Floer homology, S^1-equivariant symplectic homology, linearized contact homology, wrapped Floer homology), and most of the exact sequences that have appeared in this context in the literature. I will explain along the way several dynamical applications of symplectic homology, ranging from embedding obstructions to persistency of intersections to finiteness of symplectic capacities.

Jean-Yves Welschinger

Title: **Topology of random nodal sets**

Abstract: I will explain how to bound from above and below the expected Betti numbers of a random linear combination of the first eigenvectors of a positive elliptic sejf-adjoint pseudo differential operator on a closed manifold. This is a joint work with Damien Gayet.

Leonid Polterovich

Title: **Persistence modules and Hamiltonian diffeomorphisms**

Abstract: Theory of persistence modules is a rapidly developing field lying on the borderline between algebra, geometry and topology. It provides a very useful viewpoint at Morse theory, and at the same time is one of the cornerstones of topological data analysis. In the course I'll review foundations of this theory and focus on its applications to symplectic topology. In parts, the course is based on a recent work with Egor Shelukhin arXiv:1412.8277

Mohammed Abouzaid

Title: **Lagrangian Floer cohomology in families**

Abstract: I will begin by reviewing Lagrangian Floer cohomology, and proceed to describe how families of Lagrangians lead to sheaves over the parameter space whose fibres are the usual Floer cohomology groups.