1077-68-1943 **Mikhail Belkin**, **Qichao Que**, **Yusu Wang*** (yusu@cse.ohio-state.edu) and **Xuanyuan Zhou**. *Toward understanding complex data: graph Laplacians on singular manifolds.*

In manifold learning, algorithms based on graph Laplacian constructed from data have received considerable attention both in practical applications and theoretical analysis. Much of the existing work has been done under the assumption that the data is sampled from a manifold without boundaries and singularities or that the functions of interest are evaluated away from such points. At the same time, it can be argued that singularities and boundaries are an important aspect of realistic data. For example, singularities appear when two different manifolds intersect or if a process undergoes a "phase transition", changing non-smoothly as a function of a parameter.

In this talk I will present some results from our recent study of the behavior of graph Laplacians on singular manifolds. In particular, we consider boundaries and two types of singularities: intersections, where different manifolds come together and sharp "edges", where a manifold sharply changes direction. We show that the behavior of graph Laplacian near these singularities is qualitatively different from that in the interior of the manifolds. Understanding such behavior will lead to interesting applications in learning and analyzing complex data. This is joint work with M. Belkin, Q. Que, and X. Zhou. (Received September 21, 2011)