1115-55-303 **Elizabeth Munch*** (emunch@albany.edu) and **Bei Wang**. *Reeb Space Approximation with Guarantees.*

The Reeb space, which generalizes the notion of a Reeb graph, is one of the few tools in topological data analysis and visualization suitable for the study of multivariate scientific datasets. First introduced by Edelsbrunner et al., the Reeb space of a multivariate mapping $f : \mathbb{X} \to \mathbb{R}^r$ parameterizes the set of components of preimages of points in $\mathbb{R}^r$. Intuitively, it summarizes the data by compressing the components of the level sets of f and captures the relationship among the multiple real-valued functions within subsets of the domain. Two approximations of the Reeb space have been given, the Joint Contour Net (JCN) by Carr and Duke, and the mapper construction given by Singh et al. While it is often assumed that these constructions converge to the Reeb space, to the knowledge of the authors, no formal statement or proof to that effect has been previously given.

In this talk, we give formal results proving the convergence between the Reeb space and its discrete approximations, JCN and mapper, in terms of the interleaving distance. At a fixed resolution of the discretization, this distance allows us to quantify the approximation quality and leads to guarantees for existing Reeb space approximations. (Received September 21, 2015)