1135-53-1003 **Chen-Yun Lin***, cylin@math.duke.edu, and **Hau-Tieng Wu**. *An embedding theorem: differential geometry behind massive data analysis.*

High-dimensional data can be difficult to analyze. Assume data are distributed on a low-dimensional manifold. The Vector Diffusion Mapping (VDM), introduced by Singer-Wu, is a non-linear dimension reduction technique and is shown robust to noise. It has applications in cryo-electron microscopy and image denoising and has potential application in time-frequency analysis.

In this talk, I will present a theoretical analysis of the effectiveness of the VDM. Specifically, I will discuss parametrisation of the manifold and an embedding which is equivalent to the truncated VDM. In the differential geometry language, I use eigen-vector fields of the connection Laplacian operator to construct local coordinate charts that depend only on geometric properties of the manifold. Next, I use the coordinate charts to embed the entire manifold into a finite-dimensional Euclidean space. The proof of the results relies on solving the elliptic system and provide estimates for eigenvector fields and the heat kernel and their gradients. (Received September 18, 2017)