

## **The Structure and Interpretation of Graph Spectral Densities**

*David Bindel*

In this talk, we report ongoing work on the analysis of graphs via global summaries of the eigenvalue distributions and eigenvector behavior. Our approach is drawn from the condensed matter physics literature, where the idea of local and global densities of states is often used to understand the electronic structure of systems, and we describe how these densities play a common role in such seemingly disparate topics as spectral geometry, condensed matter physics, and the study of centrality measures in graphs. We then discuss how structural motifs manifest in the spectrum, give fast algorithms to estimate spectral densities, and conclude with a discussion of some of our current research directions in applying these tools to the analysis of large-scale graphs.