



THE UNIVERSITY OF  
CHICAGO

DEPARTMENT OF STATISTICS

## Statistics Colloquium

---

Liza Levina

Department of Statistics  
University of Michigan

“Latent space models for multiplex networks”

Monday October 30th, 2023, at 11:30 AM

Jones 303, 5747 S. Ellis Avenue

*Refreshments will be served before the seminar at 11:00 am in Jones 303.*

### Abstract

Statistical tools for analysis of a single network are now widely available, but many practical settings involve multiple networks. These can arise as a sample of networks (for example, brain connectivity networks for a sample of patients), a single network with multiple types of edges (for example, trade between countries in many different commodities), or a single network evolving over time. The term multiplex networks refers to multiple and generally heterogeneous networks observed on the same shared node set; the two examples above are both multiplex networks. We propose a new latent space model for multiplex networks which answers a key question: what part of the underlying structure is shared between all the networks, and what is unique to each one? Our model learns this from data and pools information adaptively. We establish identifiability, develop a fitting procedure using convex optimization in combination with a nuclear norm penalty, and prove a guarantee of recovery for the latent positions as long as there is sufficient separation between the shared and the individual latent subspaces. We compare the model to competing methods in the literature on simulated networks and on a multiplex network describing the worldwide trade of agricultural products. This is joint work with Peter MacDonald and Ji Zhu.