1145-62-2094 **Diana Cai***, 35 Olden Street, Princeton, NJ 08544, and **Nate Ackerman** and **Cameron Freer**.
Digraphon estimation via step-function approximations.

Exchangeable graphs arise via a sampling procedure from symmetric, measurable functions known as graphons, which characterize many popular network models for undirected graphs, such as the stochastic block model. A natural nonparametric function estimation problem is how well we can recover a graphon given a single graph sampled from it. One general framework for estimating a graphon uses step-functions obtained by partitioning the nodes of the graph according to some clustering algorithm. Regularity lemmas describe the size of the partition required to obtain a given quality of estimation.

In this talk, we present a few simple algorithms for graphon estimation with step-function approximations, based on clustering vertices according to their edge densities. Next, we also discuss how these can be extended to directed graphs via measurable objects known as digraphons. Using digraphons, we first show how to construct models for exchangeable directed graphs, including special cases such as tournaments, linear orderings, directed acyclic graphs, and partial orderings. We then show how to construct priors on digraphons via the infinite relational digraphon model (di-IRM), a new Bayesian nonparametric block model for exchangeable directed graphs. (Received September 24, 2018)