1154-92-2133 **Daniel B Cooney*** (dcooney@math.princeton.edu), Program in Applied and Computational Math, Fine Hall, Washington Road, Floor 2, Princeton, NJ 08540. *Ecology and Infectious Disease on Large Metapopulation Graphs.*

In this presentation, we discuss reaction-diffusion models for predator-prey or SIS disease interactions in patch-structured populations with between-patch dispersal on large graphs. For these problems, we aim to unify two classical approaches for studying spatial dynamics in ecological systems: spatially-continuous models where dispersal typically follows a local diffusion operator and spatially-discrete patch models with more general network connectivity between the patches. Making use of the recently-developed formalism of graph limits, or graphons, we derive a continuum analogue of patch reaction-diffusion models which can describe the role of dispersal in the presence of non-local connectivity schemes like small-world or power law networks. A useful feature of these continuum limits is that one can find threshold quantities for the onset of pattern formation in predator-prey models and for persistence of a disease outbreak in terms of the largest eigenvalue of the graphon's Laplaican operator, and therefore the qualitative behavior of these metapopulation dynamics is intricately linked to the topology of the dispersal network. (Received September 17, 2019)