

# ON GRAPH LIMITS AS MODELS FOR INTERACTION DATA

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**ABSTRACT:** Network data has become a staple in many different applications, ranging from ecology, to neuroscience and systems biology. Its inference will of course depend on the application where we collect the network data, but I will discuss some general principles based on probabilistic symmetries such as permutation invariance. Just like other probabilistic invariances, the distributional invariance to permuting indices of a matrix of interactions implies a representation theorem (the Aldous-Hoover theorem). This representation is in terms of a graph limit function, or graphon. I will discuss the representation, how to make inferences based on this representation, what to do if distributional permutation invariance does not hold, and what to do if we have additional information such as time stamp of interactions, multiple interactions or additional covariate data.

**KEYWORDS:** network data, stochastic blockmodel, graph limit