1125-14-1854 **Luca Weihs*** (lucaw@uw.edu) and **Mathias Drton** (md5@uw.edu). *Combinatorial Conditions for Generic Identification in Structural Equation Models.* Preliminary report.

Linear structural equation models relate the components of a random vector using linear interdependencies and Gaussian noise. Such models can be naturally associated with a mixed graph, a graph containing both directed and bidirected edges, where the graph's vertices correspond to the components of the random vector, the directed edges represent the linear relationships between components, and the bidirected edges encode unobserved confounding. Our question of interest is that of generic identifiability, whether a generic choice of linear and confounding effects can be uniquely recovered from the joint covariance matrix of the random variables. An existing combinatorial criteria for establishing generic identifiability is the Half-Trek Criterion; this criterion uses the existence of trek systems in the mixed graph to discover generically invertible linear equations. By iteratively exploiting such systems, a sufficient condition for generic identifiability can be checked in polynomial time. By considering additional combinatorial properties of mixed graphs, we show how we may discover new invertible equation systems and, thereby, extend the applicability of the Half-Trek Criterion. We then consider both polynomial and exponential time algorithms leveraging our observations. (Received September 19, 2016)