1077-62-424 **David J. Marchette*** (dmarchette@gmail.com), **Carey E. Priebe**, **Rebecca F. Goldin** and **Giorgio A. Ascoli**. *Investigation of a Random Graph Model for Neuronal Connectivity.*

It has been hypothesized that mammalian brains contain a reduced set of neuron classes which, to first order, determine the connectivity of the neurons. A key requirement for testing this hypothesis is the ability to infer the classes from the connectivity. Since mammalian brains have 10^8 to 10^{11} neurons, this inference must be performed on very large directed graphs. We describe a random graph model that, when combined with model based clustering, provides an estimate of both the number and membership of the classes. The random graph model uses sparse matrix techniques to fit the parameters, allowing the estimation to be performed on large graphs. We discuss the algorithm and present recent results proving its consistency. We illustrate the algorithm through simulation of a plausible set of classes and connections, for graphs of order 2^{13} through 2^{18} and discuss the issues involved in applying these techniques to much larger graphs. (Received August 31, 2011)