1135-05-44 **Eva Czabarka** and **Laszlo A. Szekely*** (szekely@math.sc.edu), szekely@math.sc.edu, and **Zoltan Toroczkai** and **Shanise Walker**. *Algebraic Monte-Carlo algorithms for the bipartite Partition Adjacency Matrix existence and construction problems.* Preliminary report.

Given a set W and numbers $d(w)$ associated with $w \in W$, and a $W_i : i \in I$ partition of W, with numbers $c(W_i, W_j)$ associated with unordered pairs of partition classes, the Partition Adjacency Matrix *existence problem* asks whether there is a simple graph G on the vertex set W with degrees $d_G(w) = d(w)$ for $w \in W$, with exactly $c(W_i, W_j)$ edges with endpoints in W_i and W_j; and the Partition Adjacency Matrix *construction problem* asks for such a graph, if they exist. (These problems are motivated by the concept of *assortativity* of network science, and the problems are conjectured to be NP-hard.) The *bipartite* version of these problems are more restricted: $I = I_1 \cup I_2$ and $c(W_i, W_j) = 0$ whenever $i, j \in I_1$ or $i, j \in I_2$.

We provide algebraic Monte-Carlo algorithms for the bipartite Partition Adjacency Matrix existence and construction problems, which run in polynomial time, say, when $|I|$ is fixed. When the algorithms provide a positive answer, they are always correct, and when the truth is positive, the algorithms fail to report it with small probability. (Received July 02, 2017)