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**Mei Yin\***, 2280 S Vine St, Denver, CO 80208, and **Lingjiong Zhu**. *Reciprocity in directed networks*.

Reciprocity is an important statistics in directed networks and has been widely used in the modeling of World Wide Web, email, social, and other complex networks. We take a statistical physics point of view and study the limiting entropy and free energy densities from the microcanonical ensemble, the canonical ensemble, and the grand canonical ensemble whose sufficient statistics are given by edge and reciprocal densities. The sparse case is also studied for the grand canonical ensemble. Joint work with Lingjiong Zhu. (Received December 29, 2014)