1135-62-2067 **Emmanuel Abbe**, **Jianqing Fan**, **Kaizheng Wang** and **Yiqiao Zhong*** (yiqiaoz@princeton.edu). *Spectral algorithm without trimming or cleaning works for exact reocvery in SBM.* Preliminary report.

The stochastic block model (SBM) is a popular random model in the study of graph clustering. The goal is to recover block membership of vertices from a random graph generated from SBM. In this work, we study the vanilla spectral algorithm for SBM with two equal-sized blocks. The core of our results is an entrywise analysis of eigenvectors: denoting by $\{u_k\}$, respectively $\{u_k^*\}$, the eigenvectors of the adjancecy matrix A, respectively $\mathbb{E}A$, we characterize conditions for which

$$u_k \approx \frac{Au_k^*}{\lambda_k^*}$$

serves as a first-order approximation under the ℓ_∞ norm. The fact that the approximation is both tight and linear in the random matrix A allows for sharp comparisons of u_k and u_k^*. In particular, it allows to compare the signs of u_k and u_k^* even when $\|u_k - u_k^*\|_\infty$ is large, which in turn allows to settle a conjecture that the spectral algorithm without any trimming or cleaning steps achieves exact recovery in SBM. Moreover, it attains minimax misclassification rates below the exact recovery threshold. (Received September 25, 2017)