Open Problem 3.3 *Let $G = (V, E, W)$ be a graph and k a positive integer, is the following true?*

$$\rho_G(k) \leq \text{polylog}(k)\sqrt{\lambda_k}. \tag{30}$$

We note that (30) is known not to hold if we ask that the subsets form a partition (meaning that every vertex belongs to at least one of the sets) [LRTV12]. Note also that no dependency on k would contradict the Small-Set Expansion Hypothesis above.

Tghgtgpeg

[LRTV12]   A. Louis, P. Raghavendra, P. Tetali, and S. Vempala. Many sparse cuts via higher eigenvalues. *STOC*, 2012.

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