Our Result

Theorem [**K,** Woodruff NeurIPS ’23]: Any algorithm using $n^{2-\beta}$ linear measurements per round must run for $\Omega(\log n / \log \log n)$ rounds to output B satisfying

$$\|A - B\| \leq 2\sigma_{r+1}(A)$$

- Essentially, no intermediate tradeoff

Proof Ideas

- Suffices to produce a distribution of instances for which there is no deterministic algorithm

- Sample $u, v \in \mathbb{R}^n$ and $G \in \mathbb{R}^{n \times n}$ all with independent Gaussian coordinates

$$A = \frac{\alpha}{\sqrt{n}} uv^T + G$$

- $\|G\|_2 \leq 2\sqrt{n}$

- If α large, say > 10, algorithm must approximate u and v to output LRA