

Scratch

$$T_{i,j} = \begin{cases} 1 & \text{if user } i \text{ likes product } j \\ 0 & \text{if user } i \text{ doesn't like product } j \end{cases}$$

↓ Sample ↓

$$\tilde{T}_{i,j} = \begin{cases} \frac{T_{i,j}}{p} & \text{w.p. } p = \frac{16n}{\eta^2(\|T\|_F^2)} \\ 0 & \text{otherwise} \end{cases}$$

↓ Compute Row i Approx via Quantum Projection ↓

$$(\tilde{T}_{\geq \sigma, \kappa})_i = \left| \tilde{T}_{\geq \sigma, \kappa}^\dagger \tilde{T}_{\geq \sigma, \kappa} \tilde{T}_i \right\rangle = \text{user } i\text{'s predicted preferences}$$

$$\tilde{T} = \sum_i \sigma_i u_i v_i^\top \implies \begin{cases} \tilde{T}_{\geq \sigma} = \sum_{\sigma_i \geq \sigma} \sigma_i u_i v_i^\top \\ \tilde{T}_{\geq \sigma, \kappa} = \sum_{\sigma_i \geq \sigma \text{ and some } \sigma_i \in [(1-\kappa)\sigma, \sigma)} \sigma_i u_i v_i^\top \end{cases}$$

↓ Measure ↓

$$\text{Recommend product } j \text{ to user } i \text{ w.p. } \frac{\left| (\tilde{T}_{\geq \sigma, \kappa})_{i,j} \right|^2}{\|(\tilde{T}_{\geq \sigma, \kappa})_i\|_2^2}$$