Magic State Distillation From Quadratic Residue based CSS codes

Placeholder Subtitle

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Presentation Outline

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- Background
  - Magic State Distillation Overview
  - Transversal Gates
  - CSS Codes
  - Self-Dual Codes
  - Doubled QR Codes
  - Distillation Protocol
- Motivation and Approach
  - Yield
  - Scaling
  - Methodology
  - Hypothesis
- Simulation
  - Algorithm
  - Results
  - Analysis
- Conclusion
- Potential Future Work

Background

Magic State Distillation Overview

- Placeholder overview of why magic state distillation is required for fault-tolerant quantum computing.
- Outline key challenges addressed by distillation in this study.

Transversal Gatesets Background

- Placeholder summary of transversal gate properties and their role in error mitigation.
- Notes on constraints imposed by transversal operations on encoded logical gates.

CSS Code Formalization

- Placeholder notes on constructing CSS codes from classical linear codes.
- Mention error detection and correction properties relevant to distillation.

Self-Dual Codes

- Placeholder explanation of self-duality criteria in the CSS setting.
- Comments on why self-dual structures matter for transversal gate compatibility.

Code Structure and Construction

- Placeholder summary of the code family described in `https://arxiv.org/pdf/2408.12752`.
- Highlight key construction steps and parameters to emphasize during the talk.

Bravyi-Haah Magic State Distillation

- Placeholder outline of the protocols evaluated with the selected codes.
- Notes on assumptions, inputs, and targeted logical states.

Motivation and Approach

Distillation Yield

- Placeholder definition of yield metrics used for comparison.
- Clarify normalization and resource accounting assumptions.

Scaling With Code Length

- Placeholder observations on how yield changes with increasing code size.
- Notes on asymptotic behavior and finite-size considerations.

Bravyi-Haah Protocol for TE* and triorthogonal codes

- Placeholder recap of triorthogonal code requirements and procedure.
- Points to connect the protocol to the chosen code family.

Hypothesis

- Placeholder list of tweaks made to the standard protocol.
- Rationale for modifications and anticipated impact on performance.

Simulation

Algorithm Overview

- Placeholder description of the simulation setup and noise models.
- Mention computational tools or libraries anticipated for the study.

Pretty Graphs

- Placeholder description of the simulation setup and noise models.
- Mention computational tools or libraries anticipated for the study.

Contextualizing Results

- Placeholder interpretation of simulated performance metrics.
- Discussion points comparing outcomes to expectations or baselines.

Conclusion

HYpothesis vs Results

- Placeholder statement of the working hypothesis before analysis.
- Criteria used to judge success or failure.

Potential Future Work

What's next?

- Placeholder list of follow-up experiments and protocol refinements.
- Suggestions for code design or distillation strategy improvements.