

Introduction to Quantum Programming and Semantics

Lecture 13: Clifford circuits

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Overview

- Clifford circuits and Clifford diagrams
- Graph states with local Clifford operations
- Local complementation, pivoting
- Strong simulation of Clifford circuits
- Synthesis of Clifford circuits

Clifford circuits and Clifford diagrams

Clifford circuits

Clifford diagrams

Graph states with local Clifford operations

Graph states

Normal form

Local complementation, pivoting

Local complementation

Pivoting

Simulating Clifford circuits

Simulation of Clifford circuits

Synthesising Clifford circuits

Synthesis of Clifford circuits

Summary:

- ZX diagrams with phases $\pi/2$ are simulable but interesting
- Correspond to Clifford circuits
- Can bring to surprisingly efficient normal form graphically
- Can simulate efficiently graphically