

MINI-PROJECTS ON QUANTUM COMPUTING

1. CONSTRAINED OPTIMIZATION

2. STATE PREPARATION

3. ERROR CORRECTION

Keshav Dahiya

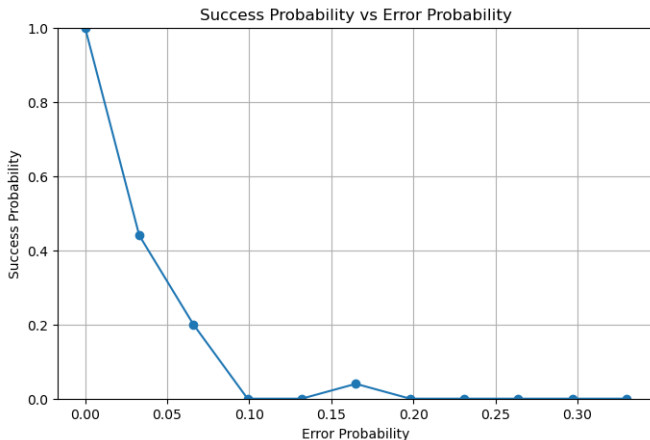
Erdős quantum computing bootcamp
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MINI-PROJECT 3: OBJECTIVES

- Choose a CSS code. We choose the self-dual $[[15,7,3]]$ quantum Hamming code.
- Write a Qiskit function that takes an error probability p as its input and outputs a quantum circuit that
 - prepares the logical all-zero state,
 - runs the state prepared through a random Pauli error channel with error rate p (for each physical qubit),
 - measures syndromes and applies the recovery operations,
 - measures the data qubits and computes the success probability (probability of measuring a component of the logical all-zero state at the end).
- The construction may use only Clifford gates, measurements, and classically controlled Pauli operations.

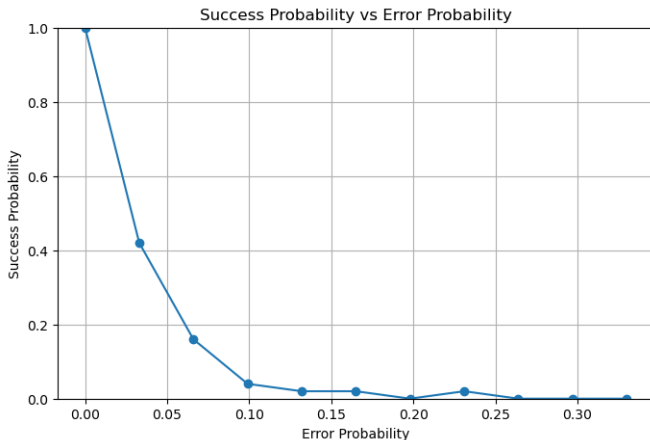
VISUALIZING SUCCESS PROBABILITY VS P

#ROUNDS = 25



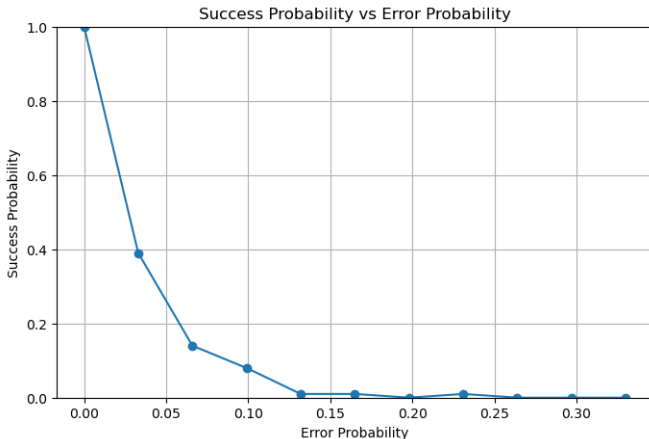
VISUALIZING SUCCESS PROBABILITY VS P

#ROUNDS = 50



VISUALIZING SUCCESS PROBABILITY VS P

#ROUNDS = 100



Thank You !