Exam1:

- Backend: Qiskit\_QASM simulation

- Noise: Depolarizing noise model

- Circuit:

1. Normal cat state preparation with normal error correction

2. (Cat state preparation) + ([4,1,4] noise-trained DQNN)

3. Repeat preparation

- Purpose: Preparation of a 4-qubit cat state

- Output: The fidelity calculated by this DQNN as an error correction process changes under multiple noise rates, and compares the fidelity changes of three different preparation strategies

- Result Analysis: DQNN shows resistance to noise and is significantly better than normal cat state preparation with normal error correction and repeat preparation

- Note: Training for the regular term still needs to be improved

Exam2:

- Backend: Aer\_simulator simulation

- Noise: Depolarizing noise model (including gates and measurements)

- Circuit:

1. (7-qubit error correction code preparation and error correction process) + ([4,1,4] noise-trained DQNN auxiliary state preparation) + (trained RealAmplitudes regular term)

2. (7-qubit error correction code preparation and error correction process) + error correction cat state preparation circuit

- Purpose: Compared to the traditional cat state with correction module, it shows the advantages of DQNN auxiliary state (fidelity, logical error rate)

- Output: Experimental images

- Result Analysis: In this noise environment, the given result analysis has obvious differences

- Note: The seven-qubit error correction code encoding circuit comes from the Stac software package generation (github: https://abdullahkhalid.com/qecft/introduction/stac/)

Exam3:

- Backend: Aer\_simulator simulation

- Noise: Depolarizing noise model (including gates and measurements)

- Circuit:

1. (5-qubit error correction code preparation and error correction process) + ([4,1,4] noise-trained DQNN auxiliary state preparation)

2. (5-qubit error correction code preparation and error correction process) + error correction cat state preparation circuit

- Purpose: Compared to the traditional cat state with correction module, it shows the advantages of DQNN auxiliary state (fidelity, logical error rate)

- Output: Experimental images

- Result Analysis: In this fair environment, the given result analysis has obvious differences

- Note: The five-qubit error correction code encoding circuit and error correction code come from the Stac software package generation (github: https://abdullahkhalid.com/qecft/introduction/stac/)