1. Coherency correlates with qubit stability and extending qubit decoherence time is important in reducing memory errors in QC. For the project, we can explore sources of qubit decoherence, methods of mitigation, and survey recent research on mitigation. As an experiement, we could measure decoherence time as a function of number of qubits in a NISQ computer.

2. For the project, we can characterize different noise in a quantum system. Noise has an impact on both results and performance. As an experiment, we can look at how different noise models affect performance of available quantum algorithms and/or benchmarks, and explore techniques that mitigate versus "correct" for noise.

3. Quantum cryptography is still theoretical because the hardware is not yet available. Simulators are used to study and develop these encryption algorithms [3]. For a project, it would be interesting to survey the literature and simulate available protocols or design an experiement that measures how quantum cryptographic techniques hold up.

For running experiment, Qiskit appears to be a versatile option [1].

References

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