## Quantum Algorithms:

**QFT:**

I have worked with QFT, to implement Quantum Arithmetic Circuits. QFT is a quantum version of the Discrete Fourier Transform algorithm, mapping each state in a superposition into the frequency space. This mapping is crucial for phase extraction, as proved in many algorithms like Quantum phase estimation algo, shor's algorithm, etc.

Apart from phase estimation and basis transformation, it is also used in quantum arithmetic circuits which is how I was introduced to this algorithm. Quantum Adder, Multiplier circuits are implemented with QFT, which proved to be efficient both computationally and qubit-wise, over classical adder circuits. Other uses that I have encountered from the literature are with Quantum simulations where these circuits appear in specifying periodic boundary conditions of vibrating lattices etc.

**Grover Search Algorithm**

Grover's search algorithm is a quantum algorithm designed to search an unsorted database providing a quadratic speedup over classical search algorithms. Although initially used for searching, its applications can be extended for other problems, including Collision Finding, and other NP-complete problems involving unstructured and non exhaustive searches.

I had the experience of designing oracles to search a combination space of pointset to find delaunay-compatible pointsets, thus hoping for a possible speedup in mesh generation processes. Even though it was functional on identity cases like for 3 points, extending it to higher points led to impossible qubit requirements.

This led me to the study of Quantum Representations like NEQR and others which are still in the research phase. Even though time wasn't sufficient to train the model, I was also very amused about the possibility of quantum representation learning and QML, being applied to solve problems with pointset representations.

## Quantum Computing Platforms,

I was very much familiar with IBM Qiskit, and Google Cirq. I have had the opportunity to work with (qumode-based) strawberry fields package to implement (continuous basis) physics-informed neural networks to solve 1D Poisson equations with different forcing terms.

Working with pennylane through task7 was very much enjoyable, and amusing learning their own ways of handling 'quantum devices' and simulators.

## Preferences:

I personally explored more literature on Quantum Machine Learning and graph neural networks and implemented multiple classification models for astronomy datasets. Which makes me more inclined toward Quantum GNN-based classification problems or any QML problems in general.