Neural Network aided LDPC Code Design for CV-QKD System
Bachelor's Thesis/Master's Thesis

Project
This thesis proposal aims to design protograph-based LDPC codes for the Continuous Variable Quantum Key Distribution (CV-QKD) system. Protograph-based LDPC codes are a class of structured LDPC codes that can be obtained by lifting a small base graph to a large parity check matrix. They have advantages such as flexibility, easy analysis, and optimization. The goal is to have good error correction performance and low decoding complexity for the CV-QKD system.

The proposal also includes implementing a neural network (NN) based scheme to optimize the protograph-based LDPC codes for the CV-QKD system. The NN-based scheme can reduce the computational costs of code optimization compared to conventional methods.

Finally, the proposal includes comparing the designed protograph-based LDPC codes with existing codes for the CV-QKD system. The comparison will be based on criteria such as decoding threshold, frame error rate (FER), key rate, and decoding complexity. This comparison will show the advantages and disadvantages of the proposed codes and provide insights for future research directions.

Tasks
1. Implementation of NN-based protograph optimization.
2. Comparison of the designed codes with the existing codes.

Requirements
- (optimally) Good skills in MATLAB/C++/Python
- Interest in channel coding