

Polar Codes for CV-QKD System

Bachelor's Thesis/Master's Thesis

Project

The proposed thesis topic is the development of a polar code and reconciliation algorithm for a Continuous Variable Quantum Key Distribution (CV-QKD) system. CV-QKD is a secure communication method that uses quantum physics principles. It involves sending a continuous beam of light and encoding information by modulating the electromagnetic wave's amplitude and phase.

This research will build upon previous work on polar codes, a channel coding approach that uses channel polarization to transform multiple identical channels into synthesized channels. Some of these channels are noiseless while others are completely noisy, allowing information to be encoded into the noiseless channels. With a smooth transition from previous work, this thesis aims to design low-rate polar codes using various channel quality estimation techniques and evaluate their performance with different decoding schemes.

In addition to the design of polar codes, this thesis will also focus on the optimization of the CV-QKD reconciliation algorithm and the decoder for the polar code. The reconciliation algorithm is a crucial component of the CV-QKD system as it allows for the correction of errors that may occur during transmission. By optimizing this algorithm and designing an efficient decoder for the polar code, the overall performance and security of the CV-QKD system can be improved.

Tasks

1. Designing low-rate polar codes
2. Evaluating the performance of designed codes
3. Optimizing CV-QKD reconciliation algorithm

Requirements

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

Institute

Communications Engineering Lab

Hertzstr. 16
Gebäude 06.45
76187 Karlsruhe
www.cel.kit.edu

Contact

M.Sc. Erdem Eray Cil

Room 210
erdem.cil@kit.edu