

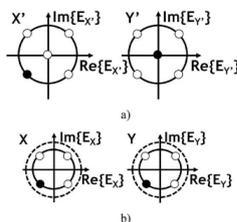
# Joint Decoding and Demodulation of Polarization-Switched QPSK

## Bachelor's Thesis

### Project

Polarization-switched QPSK (PS-QPSK) appears in coherent optical systems as a power-efficient alternative to the dual-polarization QPSK (DP-QPSK). Despite the fact that PS-QPSK only transmits 3 bits per symbol, in comparison with 4 bits per symbol in DP-QPSK, we can half the transmission power in the former without affecting the minimum distance, making this format specifically attractive for its greater sensitivity to optical noise and higher tolerance to nonlinearities, despite its reduced spectral efficiency in terms of bits/symbol/polarization.

The proposed work should explore the possibility of using existing DP-QPSK hardware both for the transmission and detection of PS-QPSK signals, where the 4-th bit of the DP-QPSK constellation has a fixed parity constraint.



### Tasks

1. Get familiarized with the equivalence of a parity-constrained DP-QPSK constellation and a PS-QPSK constellation.
2. Incorporate the extra parity constraints in the parity-check matrix.
3. Evaluate the performance of joint decoding and demodulation of PS-QPSK.

### Requirements

- ✓ Basic knowledge in communications engineering.
- ✓ Programming knowledge (MATLAB, Python or C++).

### Institute

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