Studien- / Diplom- / Masterarbeit, ET/MT

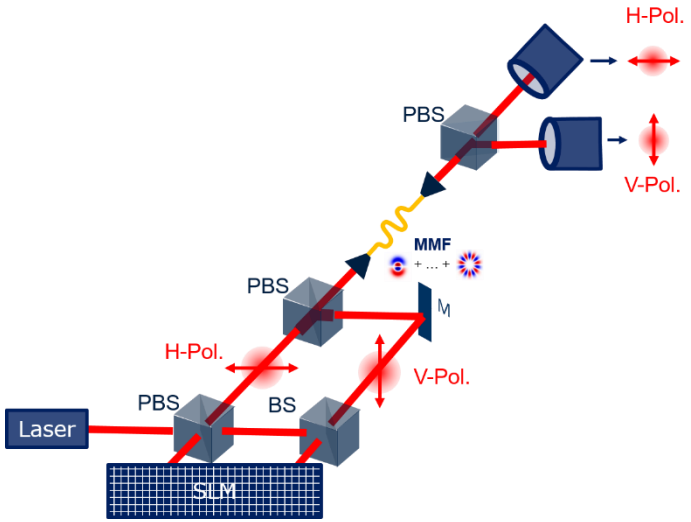
Investigation of Polarization Scrambling Characteristics of Multimode Fibers

Motivation

Global internet communications backbone systems are mainly based on optical fibers. Whereas single mode fibers are used for long-haul, multimode fibers (MMFs) are well established for short-range distances. Further, MMFs offer high potential to increase data-capacity as well as data-security.

Due to distortions inside the MMF, compensation techniques are necessary to control light transport. For this, the distortions must be characterized. Here, the behavior on polarization scrambling should be investigated. Therefore, tailored polarization states need to be generated and the resulting states at the MMF output should be measured. For evaluation, both conventional and novel deep learning techniques are applicable. The expected result is a full characterization matrix of the polarization scrambling behavior of the MMF under test. One central scientific question is, how the scrambling changes with varying MMF length or type. Eventually, the measured matrix can be used to control the light transport in each polarization state.

The task allows to gain fundamental knowledge about optical setups, measurement techniques and AI-based approaches. Basic knowledge about Optics and MATLAB/Python is desirable but not mandatory.



Tasks

- Build desired optical setup
- Control of polarization-state Beamforming with fiber launching
- Measurement of multiple polarization-states
- Evaluation within (mode-dependent) transmission matrix

Keywords

fiber communication, beamforming, polarization measurement, digital holography, signal processing, MATLAB

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