High-Capacity Multiplexing in Multimode Optical Fibers

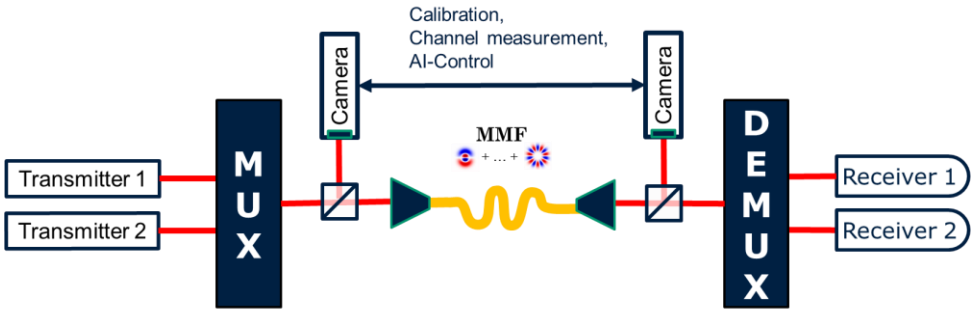
Motivation

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 data transport. For this, the distortions must be characterized. Here, the behavior on mode scrambling should be investigated. Therefore, tailored light fields need to be generated and the disturbed fields at the MMF output have to be measured.

After proper calibration, multiple parallel data-streams can be deployed within one single fiber. The goal is to evaluate boundary conditions in terms of capacity as well as parallel data-streams. One investigation could be how a change in the scrambling affects the calibration and further the capacity. For evaluation, both conventional and novel deep learning techniques are applicable.

The task allows to gain fundamental knowledge about fiber optical communications, 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
- Beamforming and launching of MMF-suitable light fields
- Measurement of high-capacity data streams
- Evaluation within (mode-dependent) transmission matrix

Keywords

fiber communication, beamforming, light field measurement, digital holography, signal processing, MATLAB

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