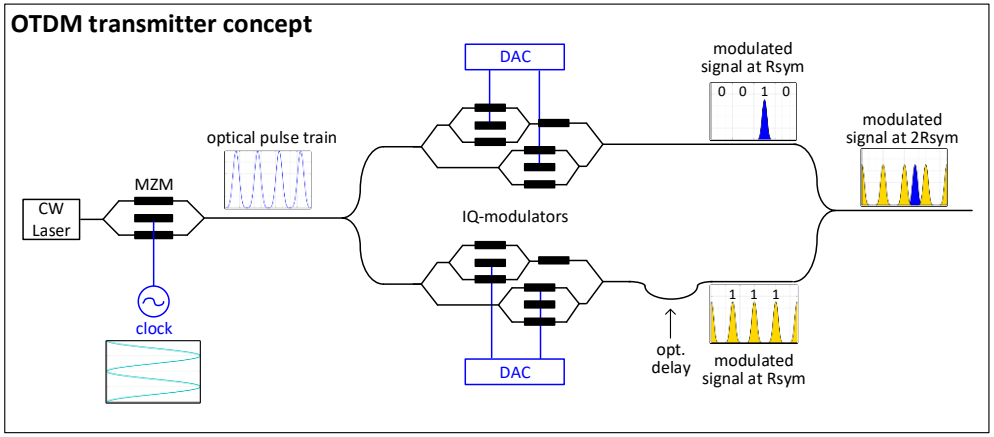
Bachelor / Master Thesis:
Optical time-division multiplexing transmitters

Karlsruhe Institute of Technology

Arbitrary waveform generation relies on CMOS-based digital signal processors (DSPs) in conjunction with digital-to-analog converters (DACs). While the demand for data throughput is consistently increasing in our modern society, the limited sampling rate and analog bandwidth of DACs is a bottleneck for waveform generation at symbol rates beyond 100 GBd. A further increase of bandwidth and sampling speed of DACs is limited by improvements of the semiconductor technologies. The exploitation of photonics is an attractive option to overcome that. The well-known concept of optical time-division multiplexing (OTDM) allows ultra-broadband optical waveform generation by optically interleaving multiple modulated waveforms that are each driven by a single low-speed DAC interface. Even though such a photonic-electronic transmitter system needs to be fully integrated for commercialization, a first proof-of-principle experiment with discrete components can help to identify challenges, tolerances and limitations of the technology.

Possible tasks:

- Investigation of optical pulse train generation with the desired duty cycle
- *Simulation* of the system to investigate its tolerances and limitations
- Development of a concept for driving two modulators by one DAC
- Proof-of-principle demonstration of an OTDM transmitter at small symbol rates for either IM/DD or coherent communications (*experimental work*)
- Implementation of the required DSP algorithms (*signal processing*)



For detailed information contact:

M. Sc. Christoph Füllner
christoph.fuellner@kit.edu
Tel. 0721-608-47173

Prof. Dr. Sebastian Randel
sebastian.randel@kit.edu
Tel. 0721-608-42490