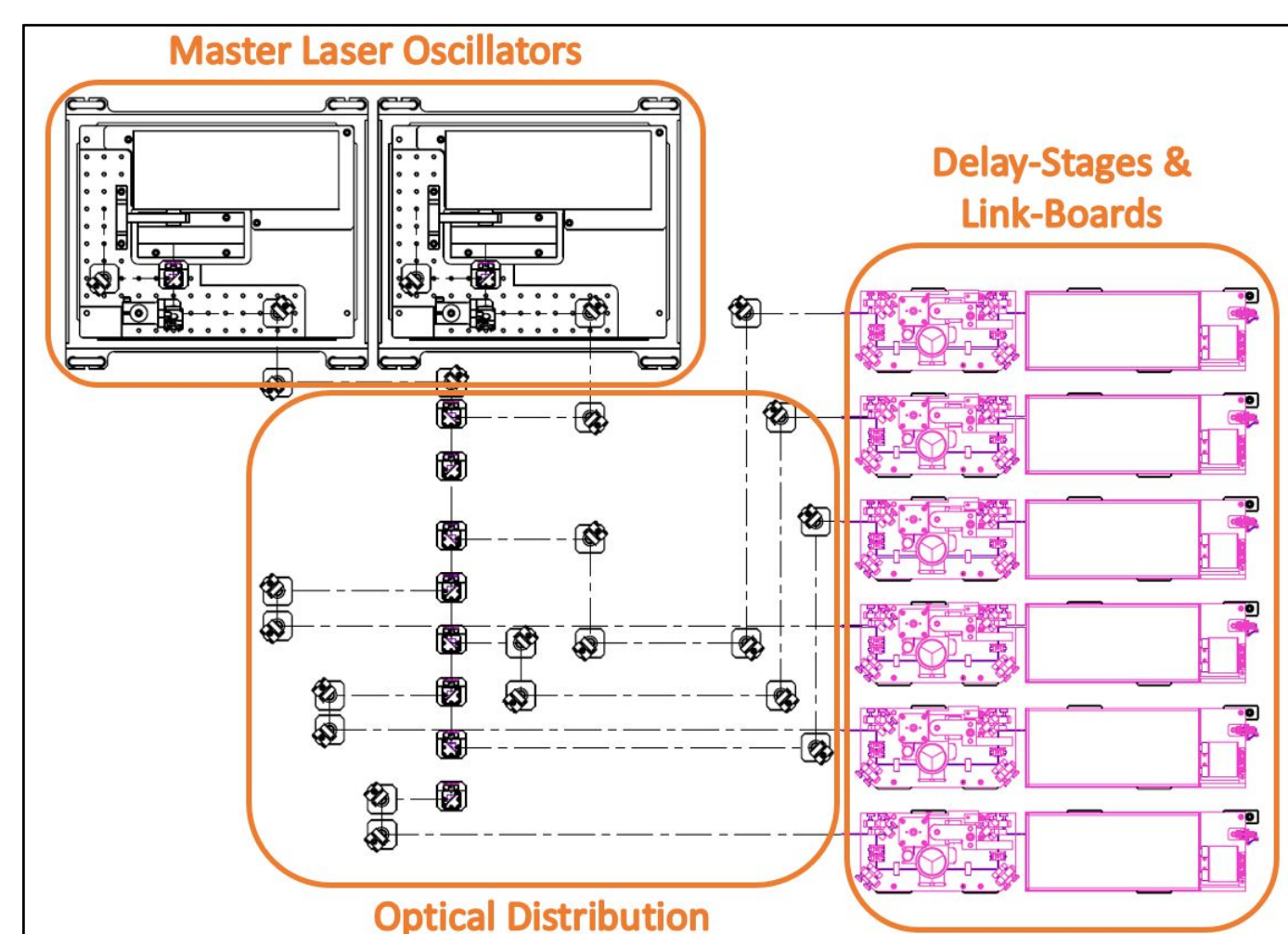


ELBE FEMTOSECOND SYNCHRONIZATION SYSTEM WITH POLARIZATION MAINTAINING FIBERS

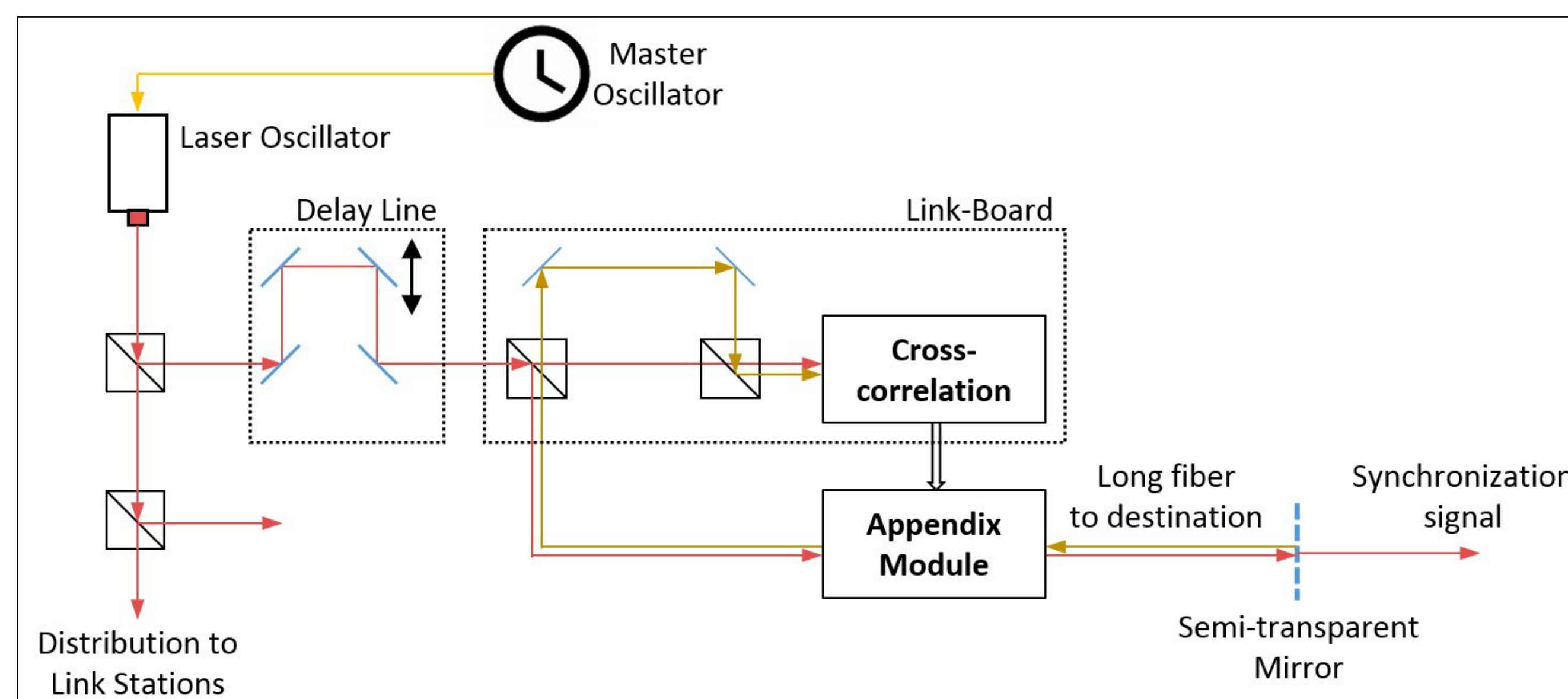
A. Schwarz, M. Kuntzsch, J. Hauser, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany
C. Sydlo, J. Müller, F. Zummack, Deutsches Elektronensynchrotron, Hamburg, Germany

The new design of the ELBE femtosecond synchronization system

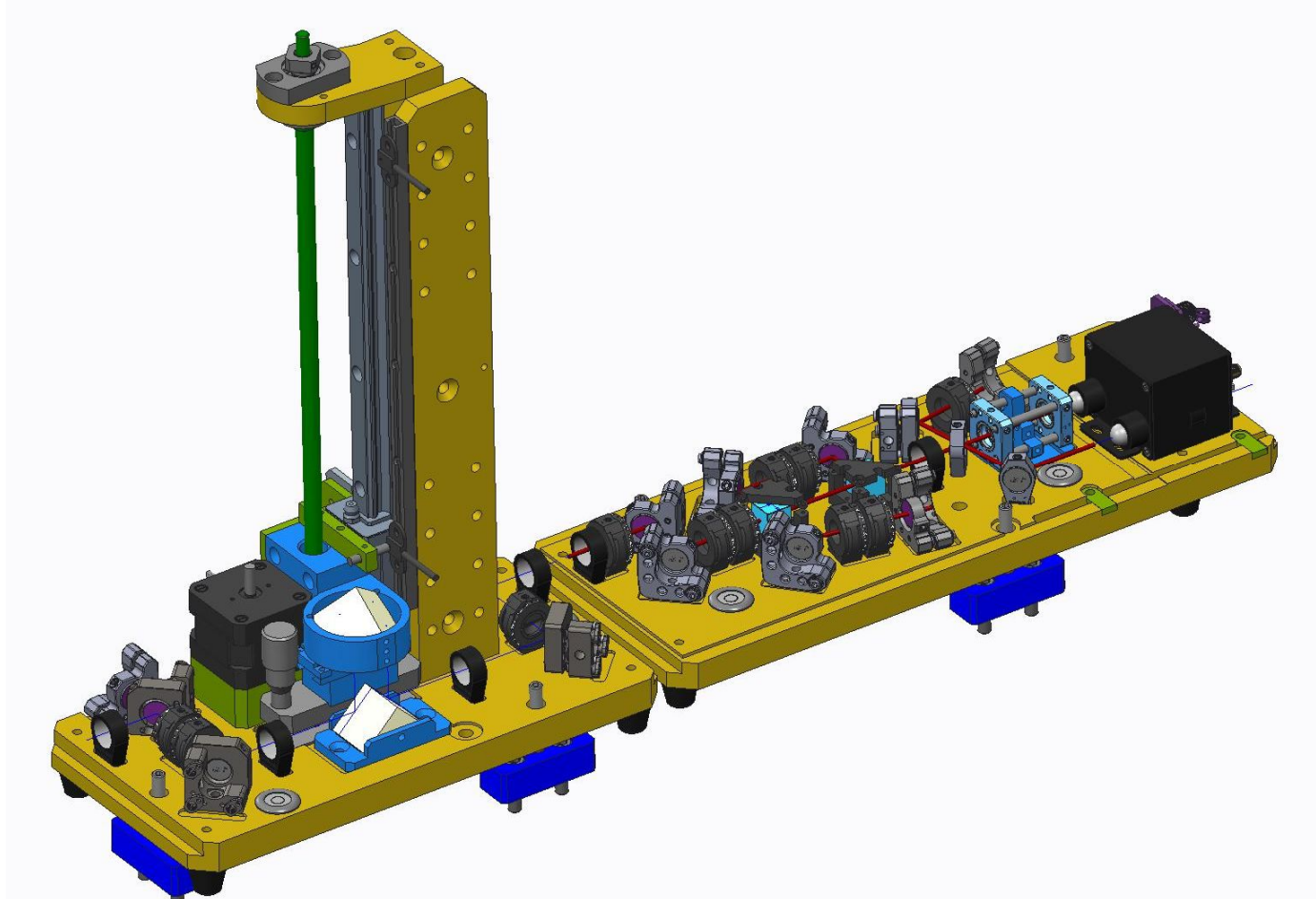
- Design of Stabilized Fiber Links with PM-Fibers provided by DESY and adapted at HZDR
- Designed optical distribution for synchronization signals from two redundant Master Laser Oscillators (MLOs) to up to six Stabilized Fiber Links
- Home-made design of an Appendix Module for in-fiber optical components and electronics
- Two Fiber Links installed for pump-probe experiments with high power laser DRACO, two additional Fiber Links for Beam Arrival Monitors (BAMs) in commissioning



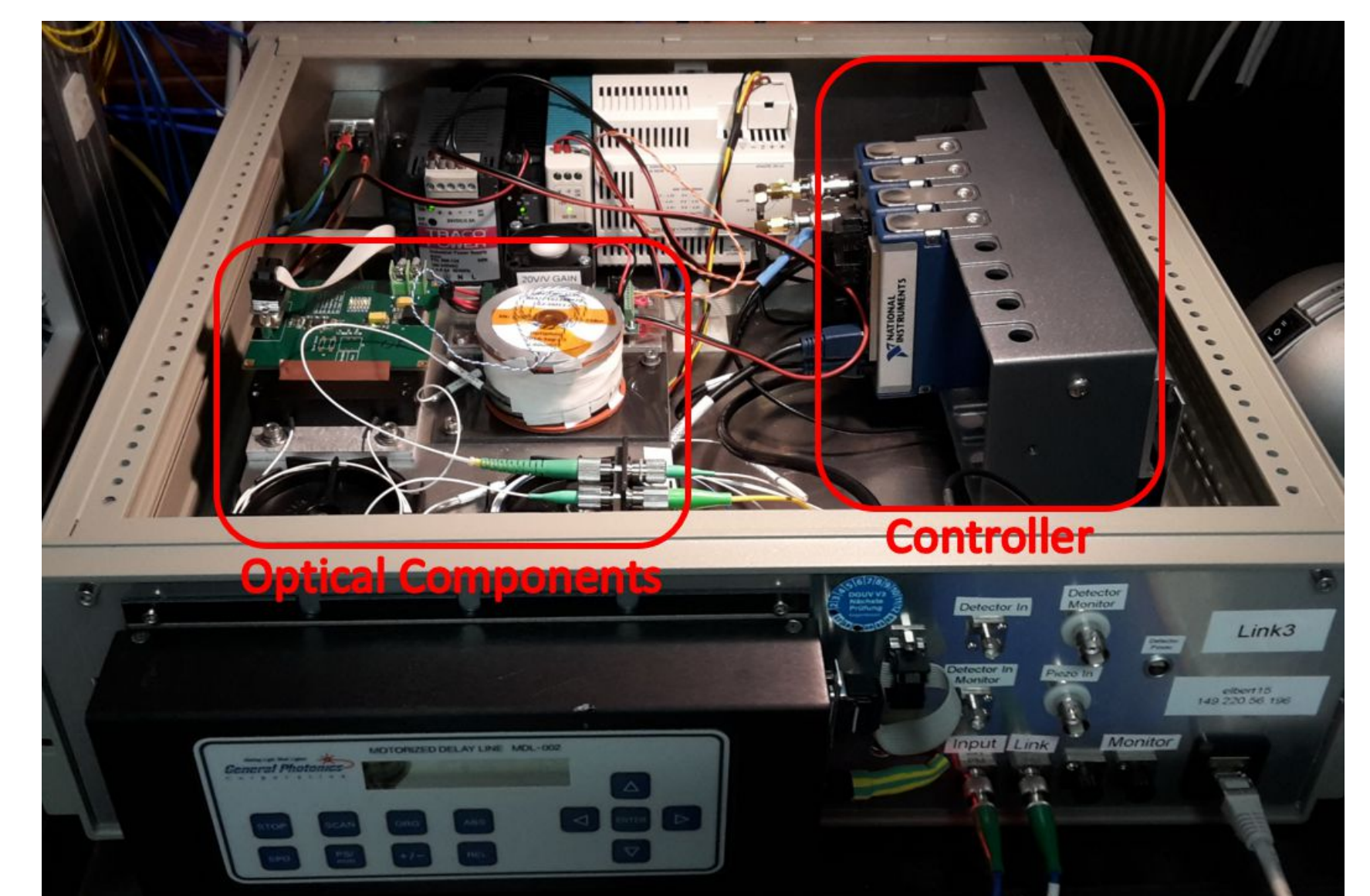
Optical Setting in
synchronization lab



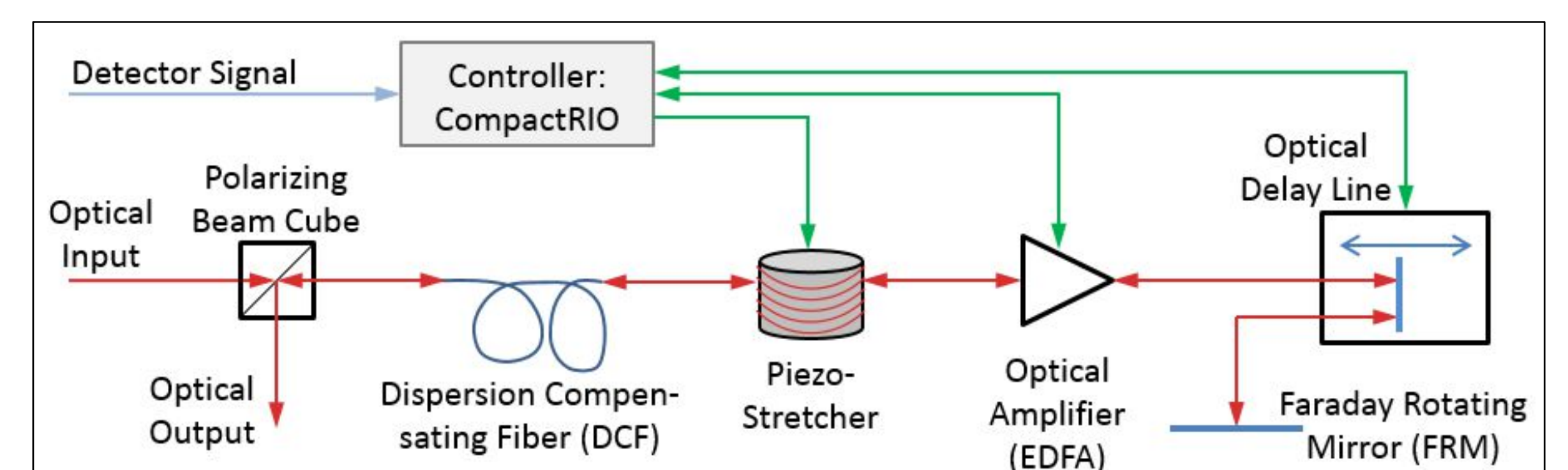
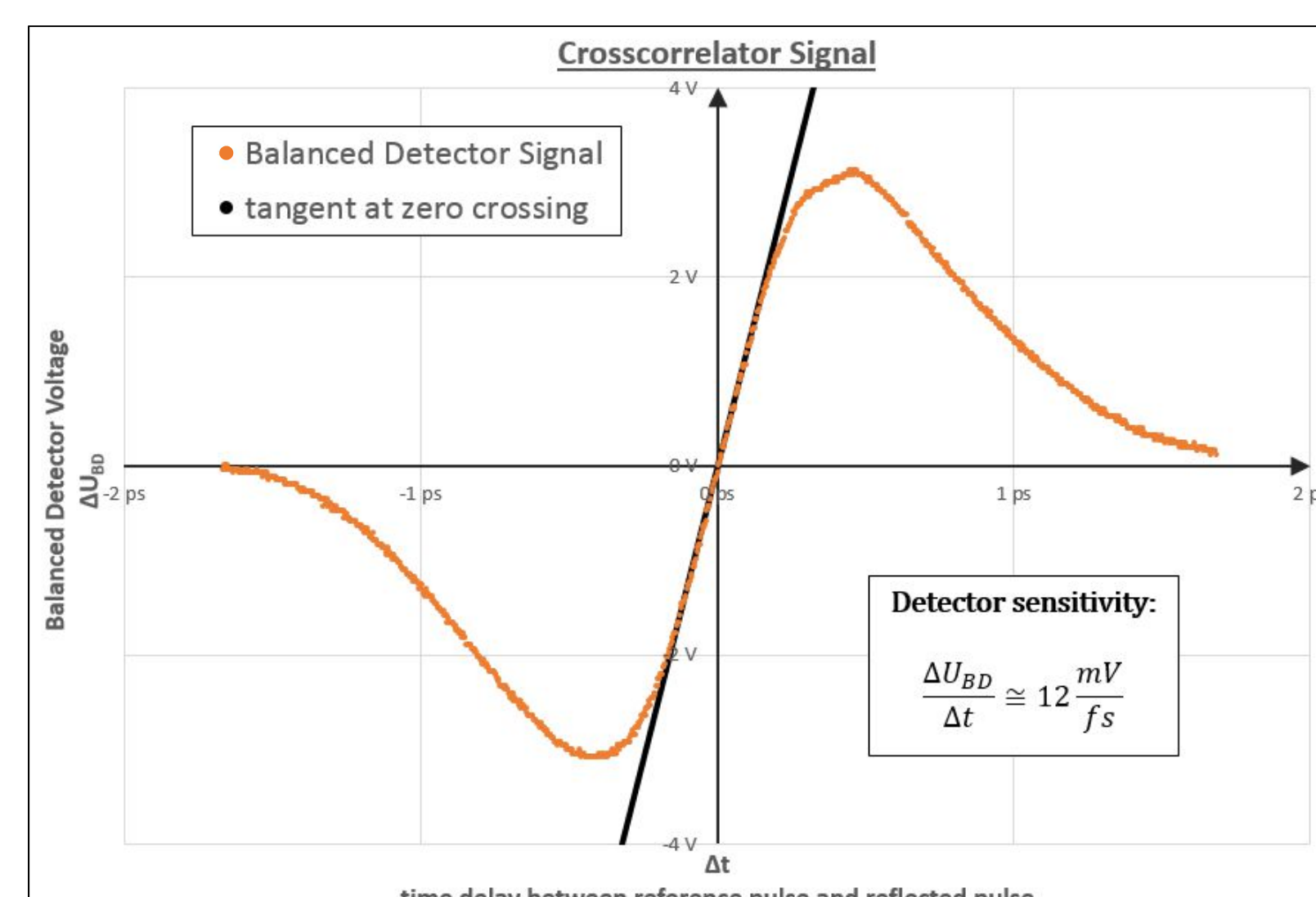
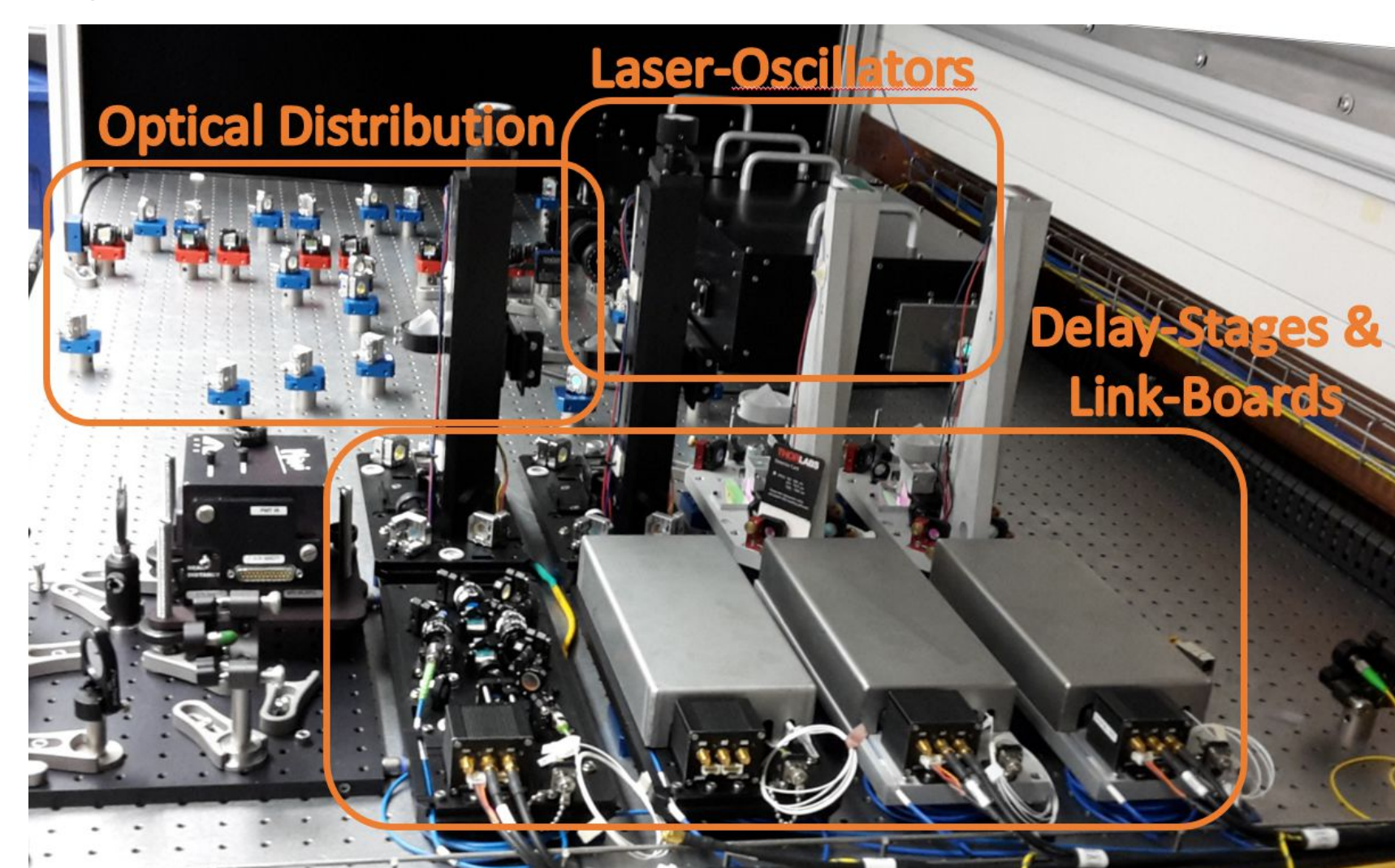
Scheme of the ELBE synchronization system



Delay Line and Link-Board



Scheme and picture of Appendix Module



Performance measurements in Spring 2019

- Measured jitter of a locked Fiber-Link in reference to Master Laser Oscillator
- Analyzed the sources of drifts and jitters
 - Delays caused by environmental fluctuations almost completely compensated
 - Residual jitter correlated to fluctuations of laser output power

Actual Challenges and Goals

- Implementation of laser power stabilization
- Repeat performance measurements to check improvements
- Issues with reliability of Origami Lasers
- Installation of one additional Stabilized Fiber Link to new high power laser PENELOPE in the next months

