AUFGABE DEM MASTERPROJEKT

im Studiengang „??? “

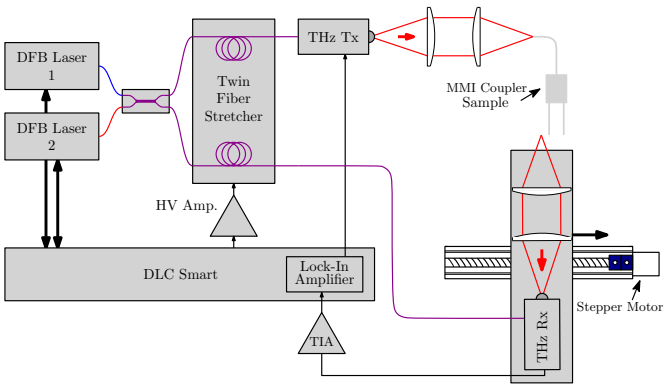
für: **???**

gestellt von: **Prof. Dr.-Ing. Balzer**

Thema: Experimental Characterization of a 3D Printed THz Dielectric Multi-Mode Interference Coupler by THz Frequency Domain Spectroscopy

Over the past few decades THz waves have drawn huge attention due to their wide application potential in homeland security, medicine, quality check etc.. Active THz devices, such as sources, amplifiers and modulators as well as passive THz devices, such as antennae, waveguides and couplers are intensively developed both by electrical and optical means.

In a the previous work, a 1x2 dielectric MMI coupler has been fabricated with a 3D printer and its transmitted intensity is qualitatively investigated by a THz source and camera, however the phase information of the output ports remains unknown. A THz frequency-domain spectroscopy system is depicted in the figure. The system consists of two precisely tunable DFB lasers which provide a difference frequency tuning up to 1.5 THz with a high spectral resolution around 10 MHz. A twin fiber stretcher enables a fast and accurate amplitude and phase scan.



In this thesis, the depicted experimental set-up with the optimum coupling efficiency shall be constructed and the 1x2 MMI coupler shall be characterized by comparing the experimental results with corresponding simulations.

The task includes the following steps:

- creating a time and work plan,
- simulating the transmission of the fabricated 1x2 dielectric coupler using the Finite Difference Time Domain method employing Empire XPU in the frequency range of 100-200 GHz,
- constructing the depicted measurement set-up and optimizing the coupling efficiency of the lens-to-waveguide-to-lens system,
- measuring the transmission as well as the relative amplitude and phase difference between the coupler output ports in the frequency range of 100-200 GHz,
- final presentation of the work, and
- submitting a digital copy of documentation and presentation in PDF format.

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