



Topic:

## **Phase stepping and demodulation in low-coherence interferometric microscopy**

At the **Christian Doppler Laboratory for Microscopic and Spectroscopic Material Research (CDL MS-MACH)** jointly with the **Institute for Communications Engineering and RF-Systems** a diploma thesis in the field of **interferometric imaging** and **signal processing** is offered. The thesis will be included in the development of an advanced 3D microscopy setup and investigation of technical microstructures (e.g. fiber-reinforced polymers).

Full-Field Optical Coherence Tomography (FF-OCT) represents a low coherence imaging technique, which is similar to white light interferometry and profilometry in some points. But additionally FF-OCT (also called coherence probe microscopy) provides sub-surface information about embedded structures within the material. As typically for coherent imaging techniques the quantity of interest (e.g. structure spatial composition, interfaces etc.) of the investigated sample is expressed in so-called amplitude-frequency modulated (AM-FM) 2D signals/ images. For the analysis of these signals different demodulation methods exist, e.g. phase stepping method requiring multiple phase shifted frames. The phase shifting can be performed by a mirror mounted at a piezo translation stage (PZT) or by an addressable reflective spatial light modulator (SLM).

Within the thesis different phase stepping strategies should be investigated, electro-optically realized on the PZT or SLM, and analyzed with respect to their accuracies. The effect of a spatial phase modulation by the SLM and the performance for single frame analysis should be considered in the field of FF-OCT.

### **Profile/Personal Qualification of the candidate:**

Ideally, the candidate should have a completed bachelor in Mechatronics/ Physics or any other technical study and is aiming for applied signal processing, programmable optics, and imaging. The candidate should be flexible to keep contact between mechatronics and physics departments, as well being interested in mathematical modelling. Some experience in LabView, Matlab or C++ is desired. We offer a dynamic research group, interesting topics and an interdisciplinary work environment.

Start / Duration: now / 6 months

### Contact:

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