University of Basel
Department of
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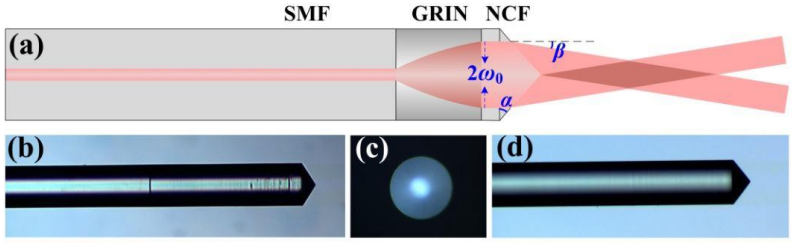
Master Thesis Proposal
Improvement the depth-of-focus of endoscopic OCT system:

Laser osteotomy is a contactless and potentially minimally invasive technology for bone surgery, providing freedom along with cutting geometry and high precision. However, one technical drawback of using lasers for osteotomy is the lack of visual feedback system. Thus, a real-time feedback system is needed to guide the ablative laser during surgery. Optical coherence tomography (OCT) is a non-invasive, high resolution, and high-speed interferometric imaging modality capable of providing 3D images of the internal microstructure within biological tissues.
Endoscopic OCT demonstrated a promising result as surgical guidance for minimally invasive surgeries. However, due to the limitation in the size of the endoscope, enhancing the DOF (in order of cm) remains a challenge for the OCT system.



Schematic diagram of the EDOF axicon probe.
[Wei Wang, et al., 2019]

This master thesis aims to study the methods for extending the depth-of-focus (DOF) of OCT system in a miniaturized design. The following steps describe the thesis:

- Conducting a literature review on the existing methods for extending DOF in OCT systems.
- Implement the chosen method in the sample arm of the OCT system.
- Evaluation the performance of the designed system.

Specific Requirements
Background in Physics, Optics. Experience in working with the optical system.
Experience in working with ImageJ, MATLAB or Python.

Supervisor
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