

Technical project / Bachelor-thesis / Master-thesis

Vorname Name, Matr.-Nr. 700 (xy CPs)

Optomechanical Design of the lens positioning for a photonic crystal fiber module

Valid in 2022 / 2023

Background

Photonic crystal fibers (PCF) are important components in short-pulsed laser systems and are the basis for Laser frequency combs (LFC). LFC are versatile tools for a wide range of applications in spectroscopy and optical metrology.

The PCF can be tailored to the needs of the operator. However, the cutting and afterwards the tapering result in a short fiber (a few 10 mm) which are quite sensitive to shocks. The pump laser must be focused onto the center of the PCF very precisely otherwise the PCF can burn. Accordingly, we want to take the PCF out of the tapering machine and place it very precisely in a module that comprises an in- and an outcoupling lens. The positioning of the lenses is a 5-axis problem and requires μm precision and repetition. In parallel the high energy short-pulsed laser must be coupled into the fiber and measured with a photodiode/power meter or spectrometer. The resulting signal must be used to adjust the position of the lens. The lens shall be glued to the module and the module closed.

The module shall be developed in another project / thesis. Both projects can be coupled in a master thesis.

The handling can be done using a 5 axis stage as shown in figure 1:

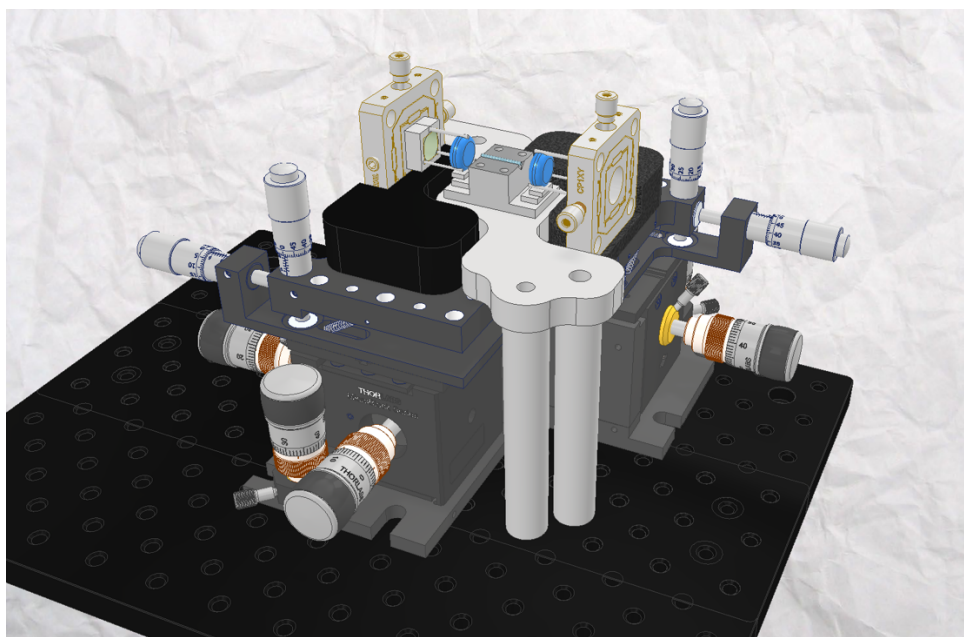


Figure 1: Preliminary sketch of the lens placement relative to the PCF module.

Beginn: tbd
Erstprüfer
Name

Ende / Abgabe: tbd
Zweitprüfer / Betreuer
Name

Purpose

Layout, design and purchasing of optomechanical components for the placement of the fibers.

Scope

From the requirements a physical design can be derived. This shall be realized in a CAD model. The manufacturing of the component shall be planned and carried out. The lens placement system shall be setup and tested in a follow-up project (Master-Thesis).

Steps

The following steps are necessary parts of the project

- Phase A:
 - Project planning in Redmine
 - Time planning with a Gantt-chart
 - Create a specification sheet
 - Physical Design
 - Derivation of Requirements
 - 3D model
- Phase B:
 - Choosing, purchasing of components
 - Setup & Alignment of the Optomechanics and the laser
 - Experiments with a stabilized laser
- Report

Contacts to other institutes or industrial companies can be developed during the project.

Beginn: tbd
Erstprüfer
Name

Ende / Abgabe: tbd
Zweitprüfer / Betreuer
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