# Optimization of Bragg grating instrumented compliant structures

**Co-promotor:** -

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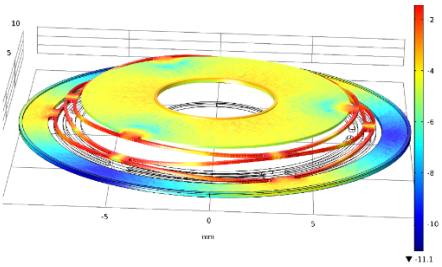
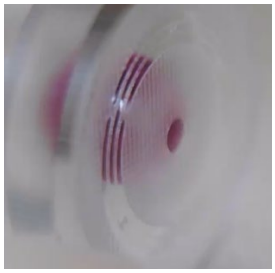
**Lab:** TIPs

**Description:**

**Context:** Femtosecond laser [1] can interact with glass to create optical waveguide and Bragg gratings, but also to micromachine glass parts in 3D at the microscale [2]. Optical Bragg gratings can also be used in combination with Surface Plasmon Resonance to provide a wide spectrum of biosensors [3]. In the TIPs department, we are developing compliant glass mechanisms, instrumented with Bragg gratings to provide strain measurement.





**Objective:** The goal of this master thesis is to optimize current designs by (1) improving the connection between the compliant glass mechanisme and an external optical fibre to limit the optical losses; (2) by optimizing the Bragg grating location in the compliant mechanism to maximize the optical signal output by Bragg reflection.

**Methods:** Literature review. Optomechanical design. Optical path measurements with a digital holographic microscope. Design, fabrication and characterisation of an original instrumented compliant glass structure.

**Prerequisites:** Mechanical design. Optics. Photonics. Interest in an experimental work.

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**References:**

*[1] Bellouard, Y., et al. "The femtoprint project." Journal of Laser Micro/Nanoengineering 7.1 (2012): 1-10.*
*[2] A. Chafai. A Volume-Tuning Capillary Gripper That Enhances Handling Capabilities and Enables Testing of Micro-Components (2022)*
*[3] Hill, Ryan T. "Plasmonic biosensors." Wiley Interdisciplinary Reviews: Nanomedicine and Nanobiotechnology 7.2 (2015): 152-168.*