

**Doctoral Networks (MSCA-DN) HORIZON – MSCA – 2022 – DN**

**Fellow R4: Optical probing and mapping of ocular tissue and cell biomechanics using interferometry**

**Closed position**

**Supervisor:** Dr. I. Grulkowski

**Host institution:** [Uniwersytet Mikołaja Kopernika W Toruniu \(NCU\)](#), Torun, Poland

**Duration:** 36 months

**PhD program:** [Doctoral School of Exact and Natural Sciences](#)

**Research group:** [Institute of Physics](#) | [Department of Biophysics](#)

**Secondments (short visits) at:** Fundació Sant Joan de Déu (**FSJD**, Spain), Politechnika Gdańska (**PG**, Poland) and **Carl Zeiss IQS Software R&D Center** (Germany)

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**Objectives**

To assess viscoelastic (biomechanical) properties of ex-vivo ocular structures using a novel optical method called tomographic micro-vibrography (TMV). The approach will be incorporated in a high-resolution microscopic system to enable in-vivo mapping of biomechanical properties of the cells and cellular structures. In addition, mathematical models will be developed, as well as dedicated machine learning (ML) algorithms to behaviour at tissue and organ levels.

**What is offered**

A fast career development, working within an interdisciplinary environment (Bio-Optics & Optical Engineering Lab); in addition to an attractive topic of research, inspiring atmosphere and the organization of international secondments, ideal for young researchers. The Bio-Optics & Optical Engineering Lab at NCU (group leader: Dr. I. Grulkowski) specializes in the development of modern optical technologies used to study fundamental problems in biology and medicine, in particular in ophthalmology and visual science. We will offer a full-time Ph.D. position for 36 months to work in NCU, in which living and mobility costs will be fully covered with a gross salary of 31,242.12 € per year.

**Required skills**

We are seeking an enthusiastic candidate that has **M.Sc. and a strong foundation in physics, optical engineering, computer science or other related fields** who is interested to develop both optical systems and software tools used for medical diagnostics. The applicant must have **proficiency in** signal and image data processing

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(i.e., LabView, Python). In particular, proven experience in developing and validation of machine learning models, programming in Python will be required.

**Additional skills**

- Ability to work in an interdisciplinary environment.
- Effective written and verbal communication skills.
- Adaptability and problem-solving skills.
- Skills in optical design and optimization (i.e., Zeemax or another platform).
- Clinical knowledge (advantageous).

The candidate will be required to pass the entrance exam (interview) to be admitted to the Doctoral School.