



Postdoctoral fellowship

Scattering of partially coherent light from the cornea

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- Funding - duration:** ERC, Synergy project Helmholtz, 1 year fellowship



The cornea is one of the few transparent biological tissues. Although its microscopic structure is that of a highly heterogeneous material at scales in the range 10 nm – 1 μ m, scattering of light is suppressed in the visible range. The connection between the microstructure and the transparency property is understood to a certain extent. In particular, the arrangement in space of collagen fibrils is a key point in the suppression of scattering.

The objective of the project is to develop a theoretical model for light scattering from the cornea, that fills the gap between fundamental studies of light scattering from disordered correlated materials, and practical applications in corneal imaging using optical coherence tomography and early diagnosis of corneal oedema. The theoretical approach will be based on perturbative models and transport equations (such as the radiative transfer equation) to predict both the transmission and reflection of scattered light. The approach will include partial coherence of the input light, a relevant point for a precise treatment of both natural light and the illumination beam used in optical coherence tomography. An expected output of the model is the quantitative description of the loss of transparency due to structural changes in the microstructure of the cornea.

Profile: the candidates should have a PhD in physics and/or optics, with an expertise in modeling of light scattering and an experience in numerical simulation.