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TOMCAT grating interferometry for biomedical imaging: Revealing the details of Alzheimer's Disease

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New developments in biomedical imaging are often the source of exciting new insights into biological systems. Such a recent technology –implemented at the TOMCAT beamline –takes advantage of the coherent nature of synchrotron light to measure minute differences in the refractive index, at an unprecedented combination of sensitivity and spatial resolution. We will give a detailed account on the principle and instrumentation of the two-grating setup, which allows for measurement of refraction angles on the order of microradians. To demonstrate the new capabilities of this setup we present a visualization of the most prominent pathological feature of Alzheimer's Disease (AD), the amyloid pathology, in the brain of an AD mouse model [1]. Amyloid plaques consist of spherical proteinaceous aggregates with a diameter of a few tens of microns that accumulate througout the brain of AD patients. With the grating interferometer, we are now able to visualize and quantitatively evaluate the plaques over large regions of interest, which will give new insight into the progression of the disease.

[1] Pinzer et al., submitted to PNAS

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