Doctoral candidate 2: Accelerated edge-illumination-based phase contrast for smart material inspection

Host Institution	University of Antwerp, Belgium
PhD enrolment	University of Antwerp, Belgium
Primary Supervisor	Prof. dr. Jan De Beenhouwer
Subject area	3D reconstruction, phase contrast, X-ray imaging

About this doctoral project and your tasks

Phase contrast imaging based on edge illumination (EI) is emerging as a technique to generate high contrast images of different materials. EI extracts phase information by shifting two absorption masks while placing the object in between. For each view, multiple projections are acquired, yielding three contrasts: absorption, refraction, and dark field. Traditional tomographic reconstruction, like Filtered Back Projection (FBP), demands dense sampling of the illumination curve at each detector pixel, leading to lengthy scans. Recent developments offer iterative EI reconstruction methods without explicit phase retrieval.

Your task will be to develop a 3D X-ray phase contrast reconstruction method that simultaneously takes into account the different contrasts that we obtain with this imaging technique, including a directional dark field model. The developed method will then be applied to the imaging and characterisation of advanced materials such as hydrogels.

Foreseen secondments

For this project, we foresee secondments to:

- **Dr. W. Twengstrom** (2 months) at Excillum (Sweden)
- **Dr. R. Mokso** (3 months) at Technical University of Denmark

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