Doctoral candidate 1: Model-based region of interest 4DCT of smart materials

Host Institution	University of Antwerp, Belgium
PhD enrolment	University of Antwerp, Belgium
Primary Supervisor	Prof. dr. Jan Sijbers
Subject area	Computational imaging, dynamic CT, inverse problems, smart materials

About this doctoral project and your tasks

You will develop an efficient 4DCT reconstruction scheme for studying dynamic materials that combines iterative image reconstruction and motion estimation in a single update step, based on the analytical gradients of the motion towards both the reconstruction and the affine motion parameters. Next, the 4DCT reconstruction scheme will be unrolled so as to combine the benefits from physics-based modelling and advanced data driven priors using dynamic recurrent inference machines. The focus of the PhD will be on lowering the dose and the required number of projections for 4D data reconstruction. These advancements will facilitate the imaging and characterisation of hydrogels. Specifically, in situ tensile tests will be performed on hydrogels to demonstrate the methodology as well as to facilitate characterisation studies in WP3.

Your tasks will include :

- The development of a dedicated and efficient 4DCT method for smart materials
- Validate the 4DCT method on real dynamic scans of smart materials (e.g. hydrogels)
- Create a demonstrator software smart materials 4DCT

Foreseen secondments

For this project, we foresee secondments to:

- **Dr. Lucia Mancini** (2 months) at Slovenian National Building and Civil Engineering Institute (Slovenia)
- **Dr. Arjen Mascini** (1 month) at Tescan XRE (Belgium)

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