Phase contrast tomography in laboratory-based X-ray micro-CT

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Due to the technical and computational evolution, X-ray micro-CT has become a common tool in 3D imaging in various research fields. As spatial resolution increases, absorption contrast can however become very small. At the same time, due to the small focal spot size required for high resolution tomography, refraction of the X-rays become visible in the projection data as an edge-enhancement effect. Although this can be benificial for edge detection in radiography, the effect results in severe artifacts in the reconstructed data.

These artifacts can be heavily reduced by applying a phase retrieval method such as the *Modified Bronnikov Algorithm* (Groso *et al.*, 2006) or the *simultaneous phase and amplitude extraction* (Paganin *et al.*, 2002). Although both methods have rather stringent assumptions, they work well in practice for samples with low attenuation (Boone *et al.*, 2009). For samples with higher attenuation, a different algorithm based on an approximation of the phase signal, the *Bronnikov Aided Correction* (BAC) (De Witte *et al.*, 2009) can be applied.

At the Centre for X-ray Tomography of the Ghent University (UGCT), both approaches are used on a regular basis for very diverse applications. Since neither method requires any change in the setup hardware, they can be readily applied to projection data from any high-resolution CT scanner.

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