Reconstruction of the refractive index gradient by X-ray diffraction enhanced Computed Tomography

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The computed tomography technique cannot easily extended to diffraction enhanced imaging (DEI), because while from DEI we may extract the refractive index gradient in one dimension, from the conventional CT reconstruction algorithm we may reconstruct only a scalar quantity. However, recently we showed that, changing the direction of the scan axis, and collecting a set of data related to the 3-D distribution of the refractive index gradient of the sample, a CT image was obtained. The algorithm we used is based on the conventional CT algorithm but with a specific preprocessing to the projection data. The mathematical framework of the procedure and a simple CT experiment are presented and discussed.

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