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# The Physics of X-ray Tomography: Not as simple as it looks

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Computed tomography (CT) is an inverse problem in which an image is reconstructed from measurements, making use of the forward problem presented by the well-known Beer-Lambert Law for the absorption of a beam of monochromatic radiation. Then, the natural logarithm of the relative intensity of a transmitted beam of radiation leads to a linear problem in the form of a Radon transform, the inverse of which results in the reconstruction of a tomograph. Inversion is typically performed using filtered backprojection, making use of the Fourier Slice Theorem, but other inversion methods are also utilized. However, the implication of relying on the simplistic forward-problem formulation of the Beer-Lambert Law, to facilitate mathematical inversion, is fraught with significant physical implications, particularly when exact quantifiable image attributes are needed. This presentation will examine the physical aspects of forward modelling not accounted for in the inversion process and their impact on exact imaging, with attention to tomography with x-rays.

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