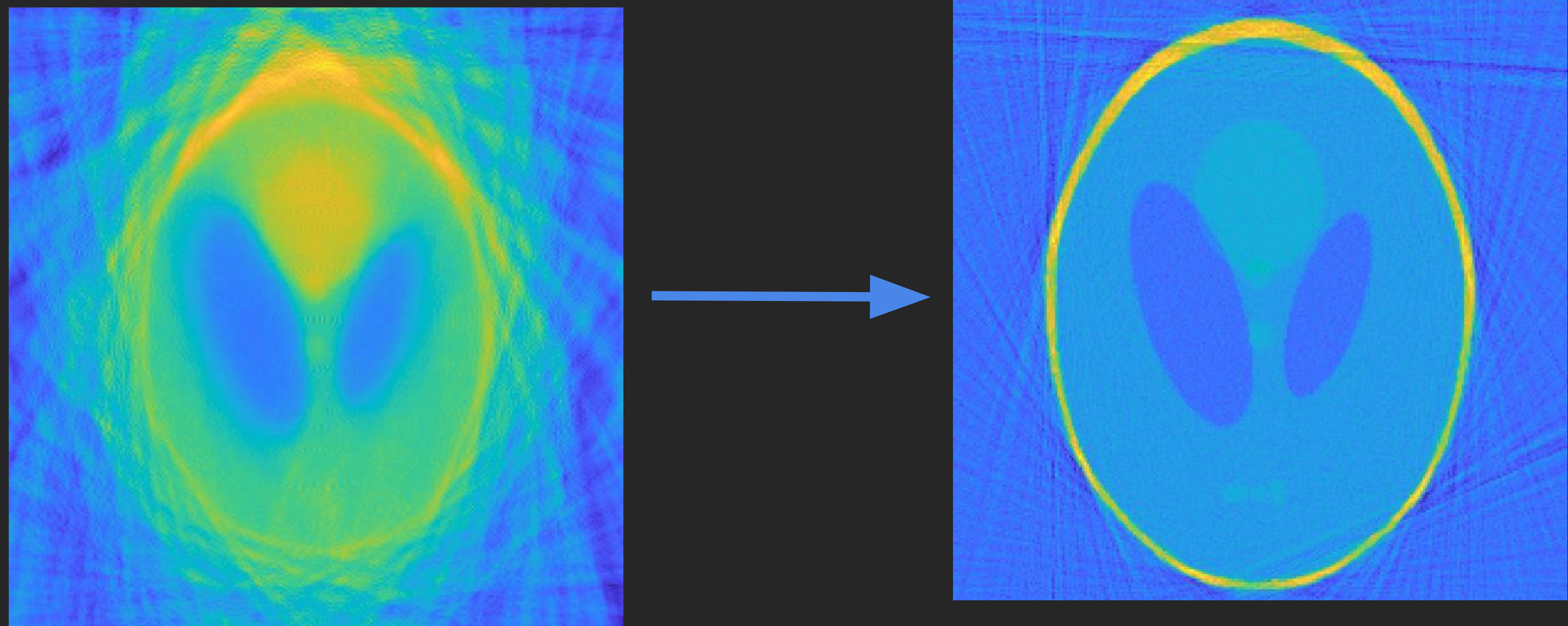


BCD: Making CT Clearer



Presenters: Mai Phuong Pham Huynh, Ana Castillo, Manuel Santana

Advisor: Jim Nagy



PRESENTERS:

Manuel
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Mai Phuong
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BACKGROUND

Computed tomography (CT) methods are becoming increasingly popular in medical imaging to produce high quality images. Recently, portable machines are being used in managing COVID-19 with assisting in infection control issues during patient transportation to CT suites. However, the geometry parameters cannot always be precisely calibrated in these point of care situations. This results in reconstructed images of poorer quality. The goal of this project is to estimate these geometry parameters to obtain a better reconstructed CT image.

METHODS

The problem of cleaning the CT image reduces to this optimization problem

$$\min_{\mathbf{x}, \mathbf{p}} ||\mathbf{A}(\mathbf{p})\mathbf{x} - \mathbf{b}||_2^2 + \lambda ||\mathbf{x}||_2^2$$

Here $\mathbf{A}(\mathbf{p})$ is a matrix \mathbf{A} created by the geometry parameters \mathbf{p} . We solve the optimization problem iteratively given given initial parameters.

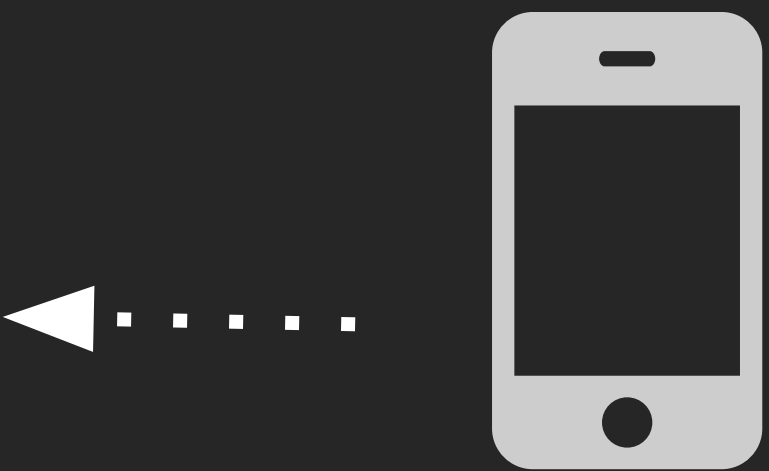
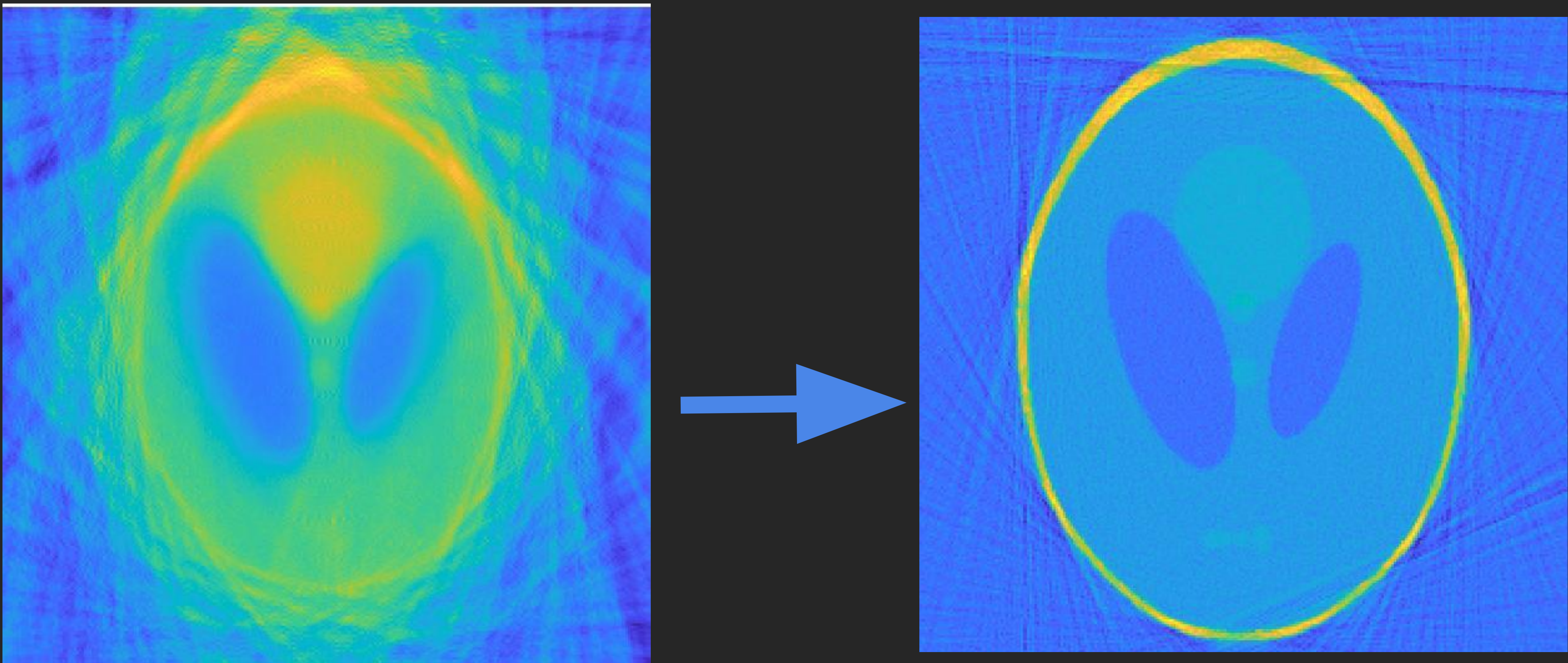
for $k = 0, 1, 2 \dots$

$$\mathbf{x}_{k+1} = \arg \min_{\mathbf{x}} ||\mathbf{A}(\mathbf{p}_k)\mathbf{x} - \mathbf{b}||_2^2 + \lambda ||\mathbf{x}||_2^2$$
$$\mathbf{p}_{k+1} = \arg \min_{\mathbf{p}} ||\mathbf{A}(\mathbf{p})\mathbf{x}_{k+1} - \mathbf{b}||_2^2$$

In this research we explore several techniques performing this optimization called block coordinate descent or BCD.



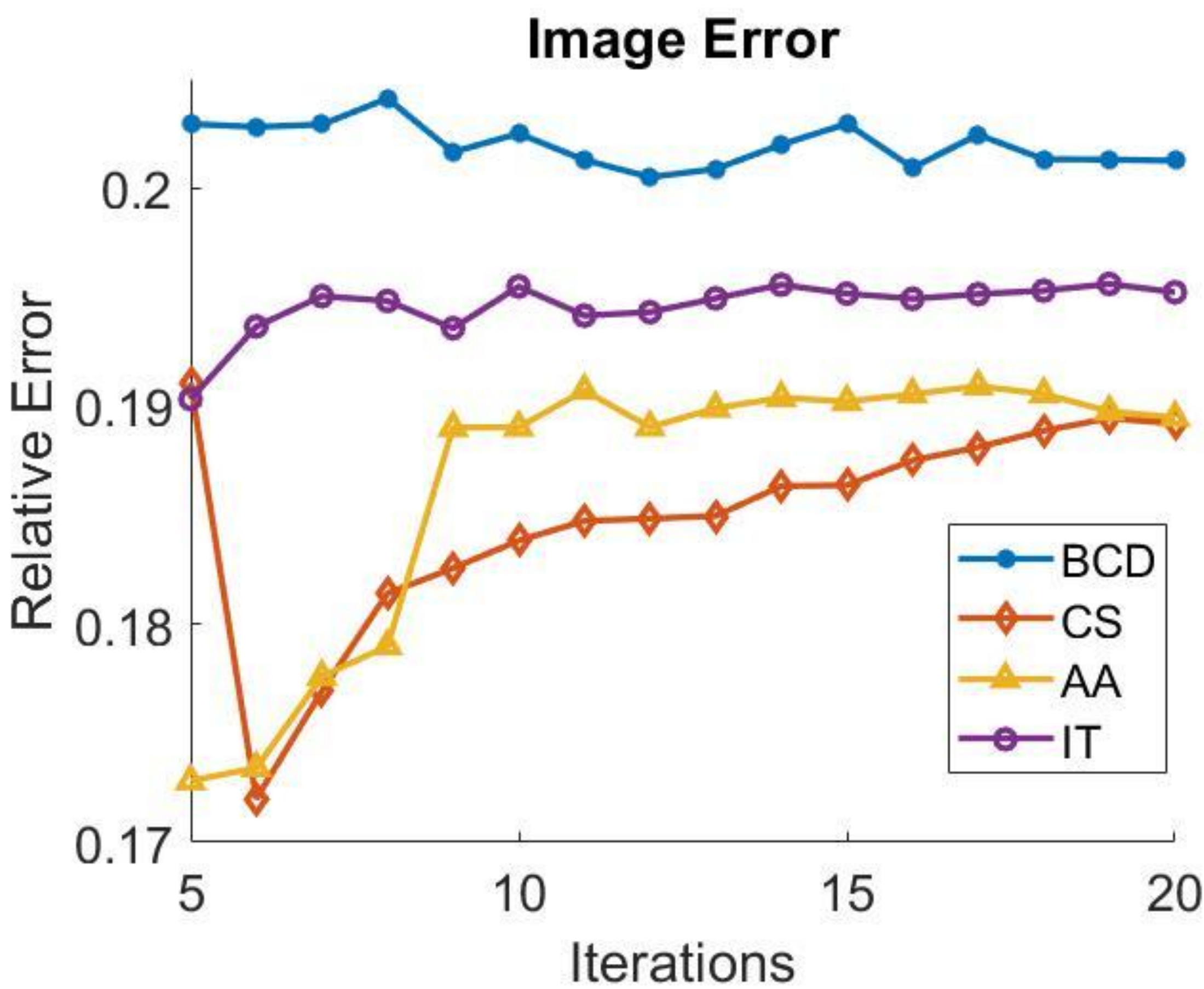
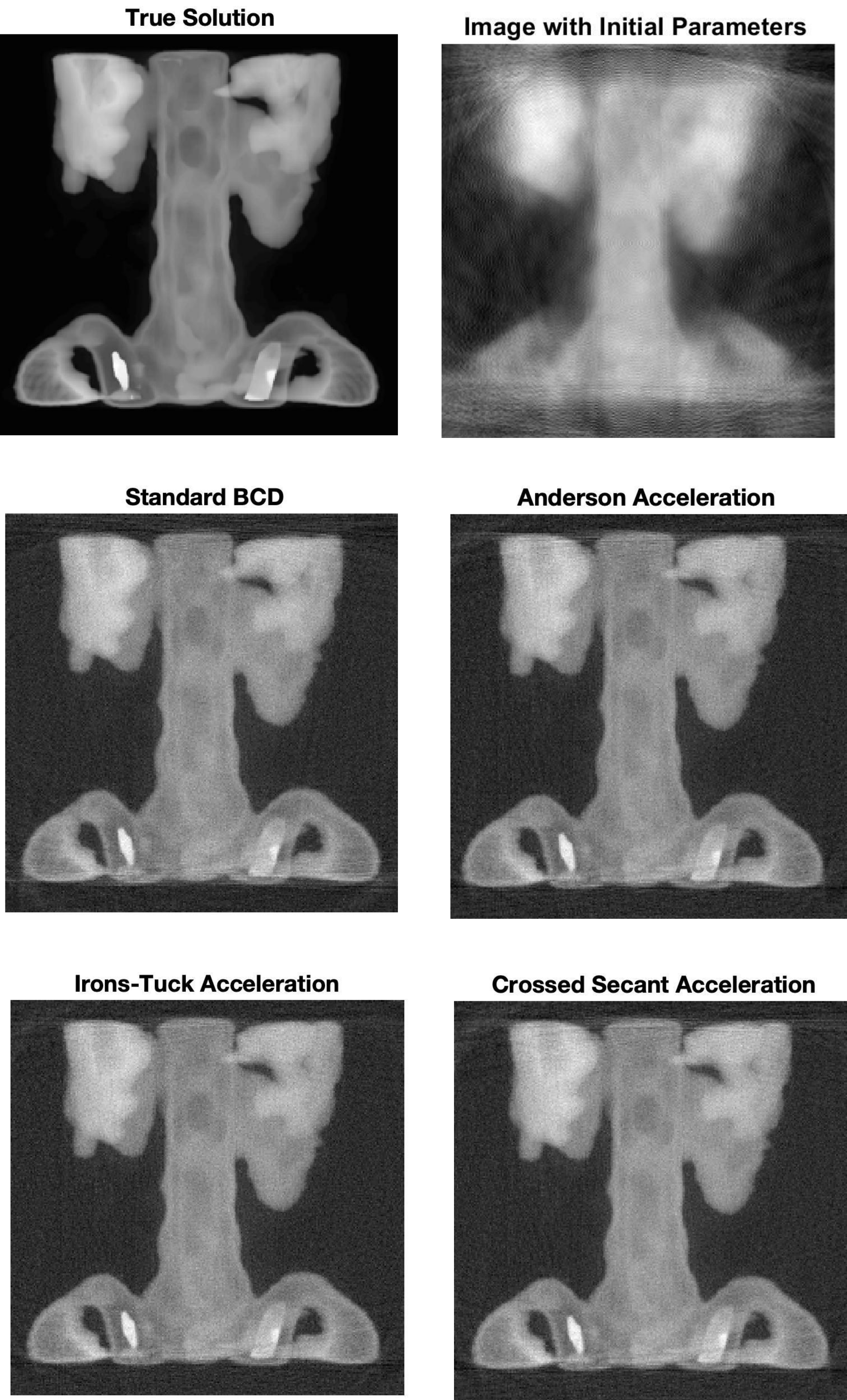
New algorithm creates clearer portable CT machine images.



Take a picture to download the preprint.

Ask for a code demo!

RESULTS





Authors::
Manuel Santana
Mai Phuong Pham Huynh
Ana Castillo

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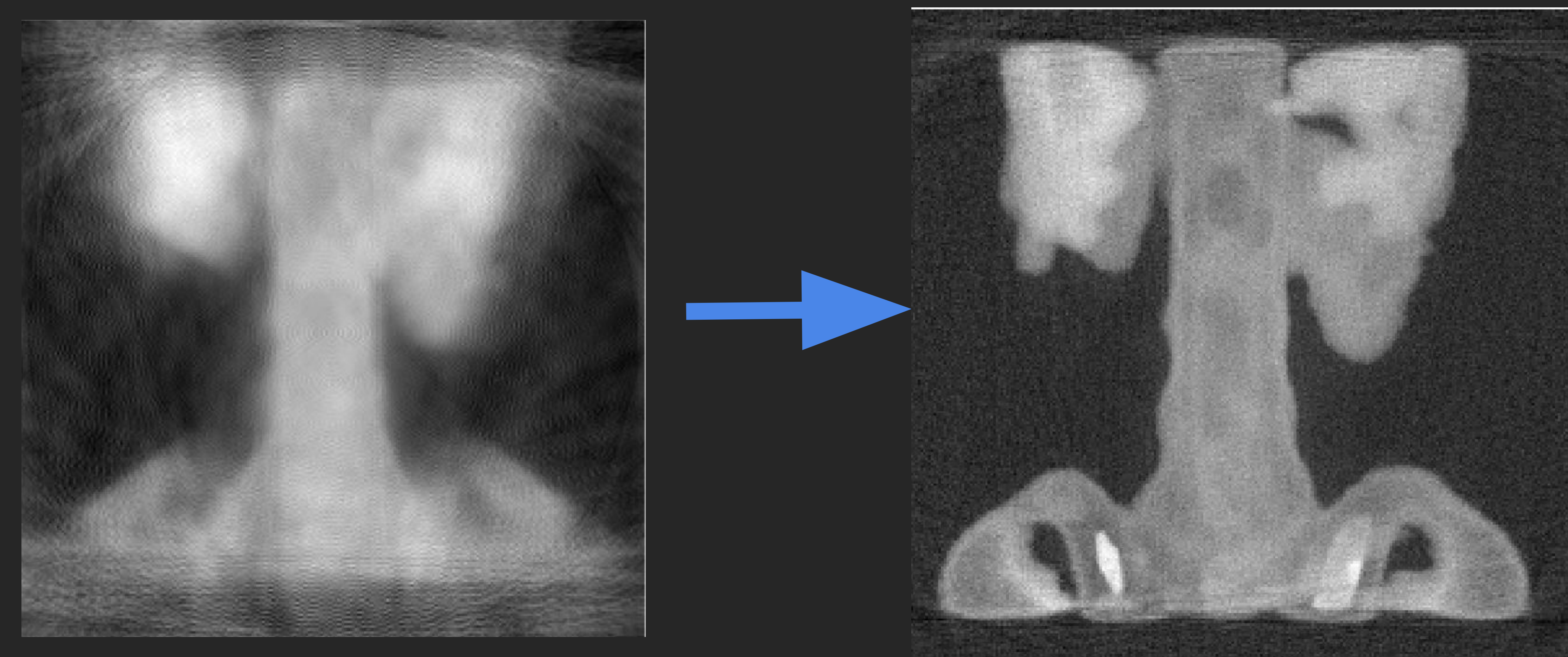
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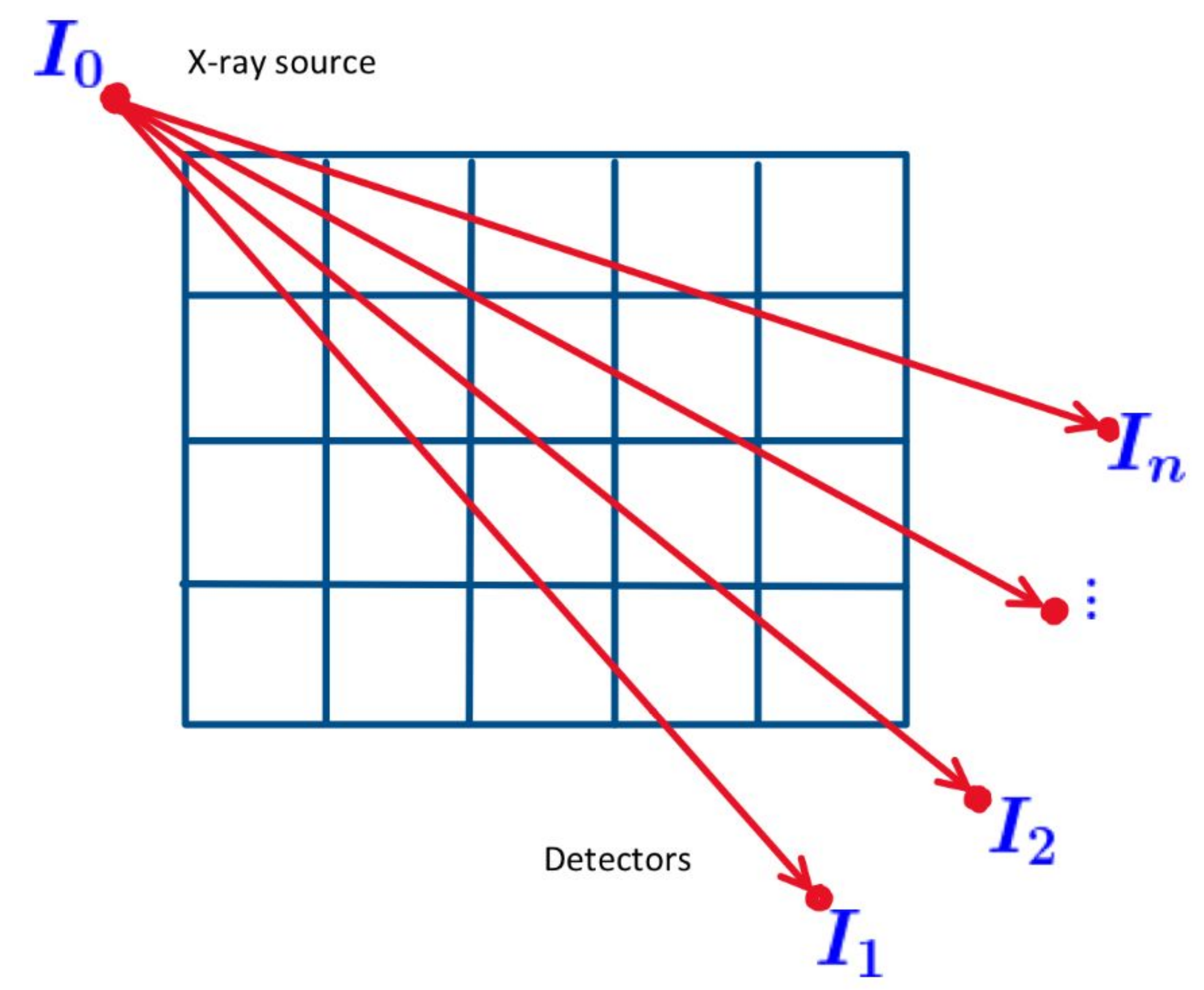
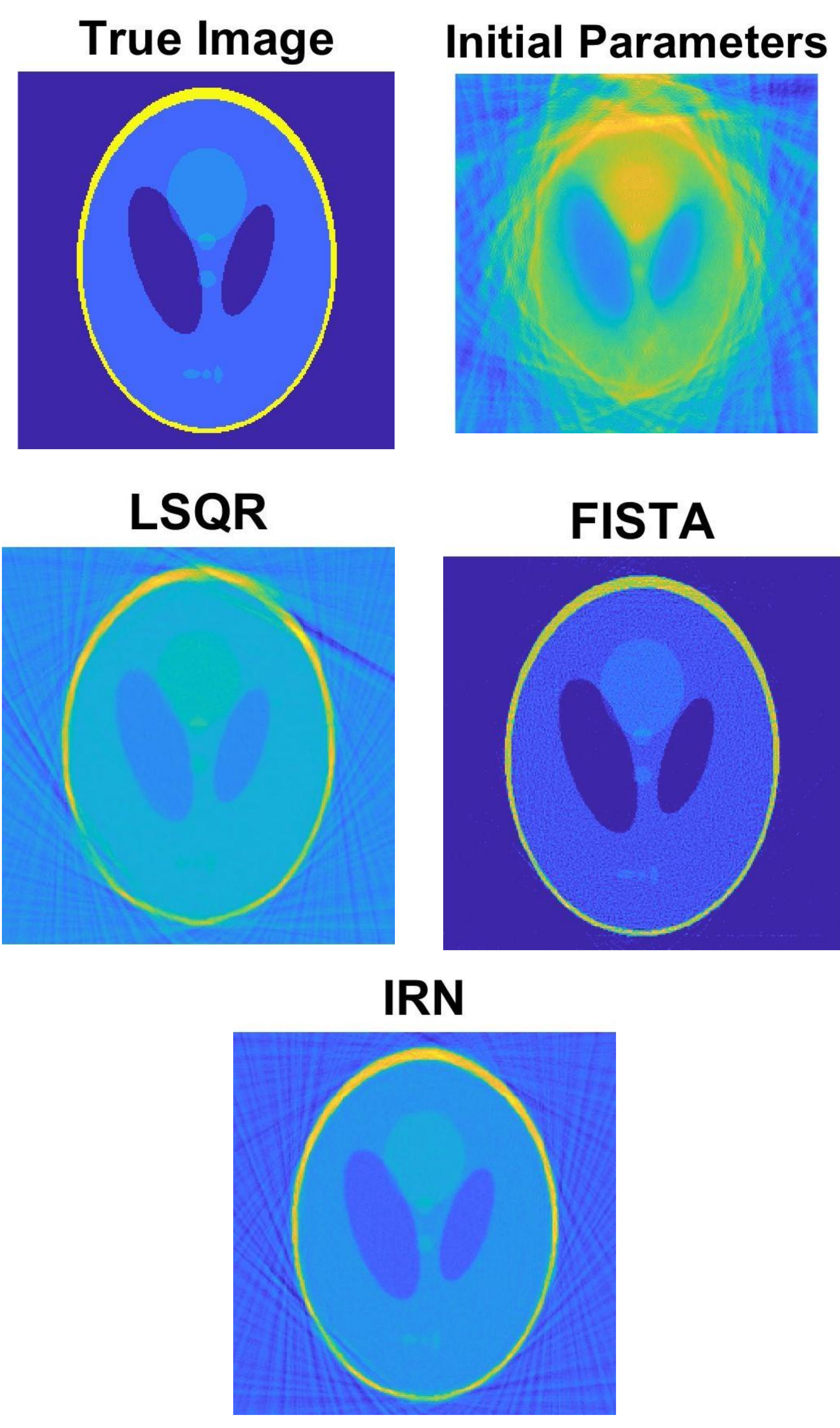
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How Tomography Works

