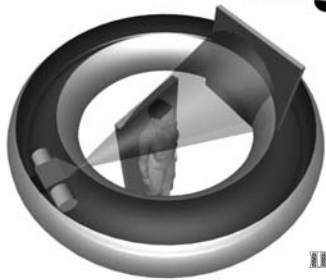


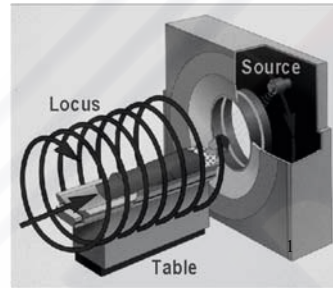
# Computed tomography

## Part II: Reconstruction algorithms



Lecture 5

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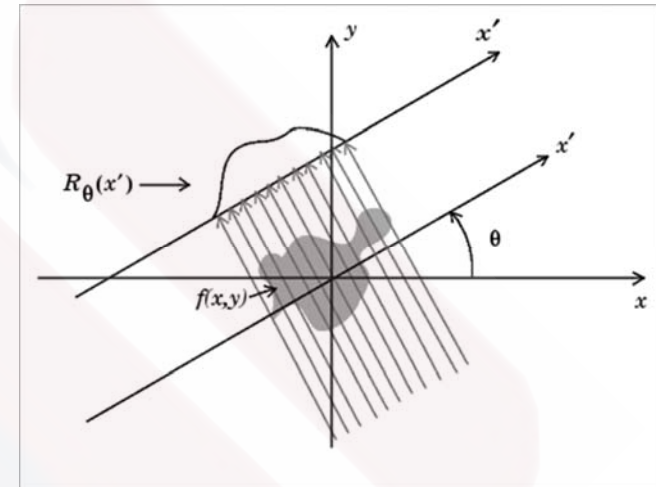


### FBP

- This is the standard algorithm that was used since CT scanners were invented.
- Characterized by short reconstruction time.

## Reconstruction algorithms

### Filtered back projection (FBP)



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### Limitations of FBP

- It is based on some mathematic assumptions of the CT system.
- Require high radiation dose to get high image quality with less artefacts.
- FBP ignores system hardware details such as focal spot size, active detector area and image voxel shape.

## Iterative algorithm

- This algorithm iterates the image reconstruction several times to better estimate the mathematic assumptions and generate images with lower noise.
- Accordingly, this process requires longer computational time and robust computers.

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## Limitations of iterative algorithm

- Over-smoothing of images.
- Some iterative techniques have long reconstruction process (even on powerful computers; about 30-60 min).

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## Strengthen point of iterative algorithm

- Allow radiation dose reduction for head and neck CT examinations.
- Prolonging the lifetime of X-ray tubes.
- Reducing the dose of pediatric CT.
- Improving image quality (increase signal-to-noise and contrast-to-noise ratio).

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## Hybrid iterative technique

- Iterative technique can be merged with FBP to produce hybrid iterative technique.

↓ the over-smoothing  
of images.

Allows short-time  
reconstruction  
process (about 1  
min).

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