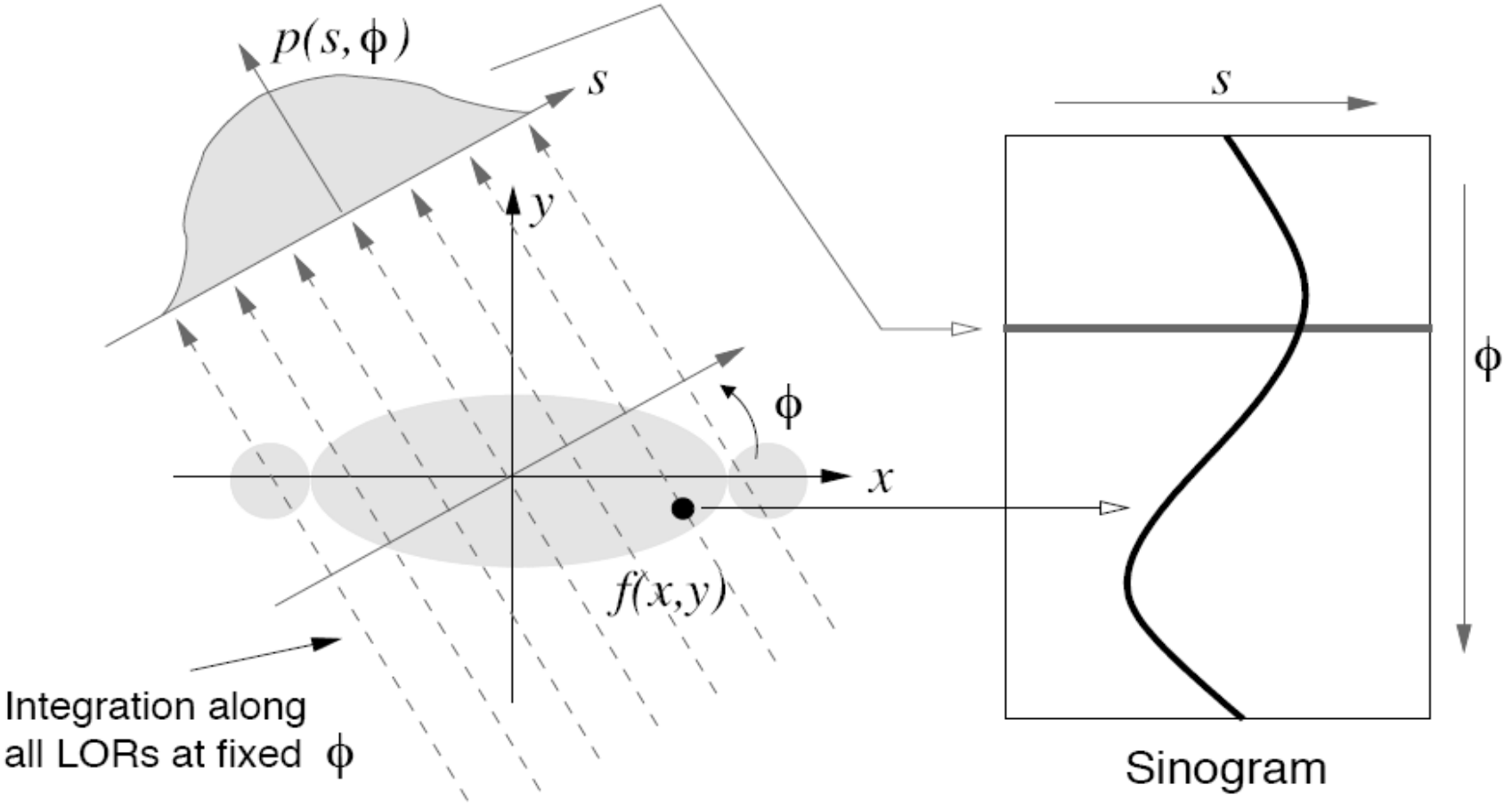
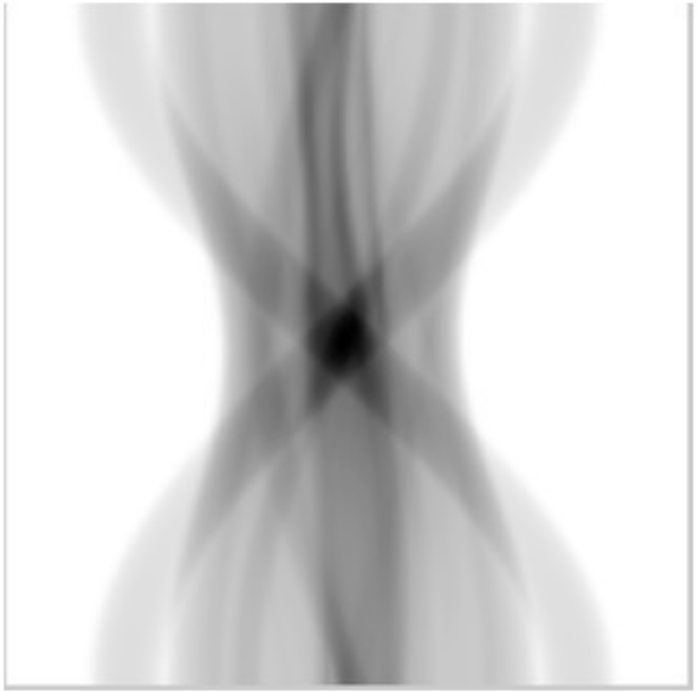
Projection function



Function <--> Projection



$f(x, y)$

What you want to know

$p(s, \phi)$

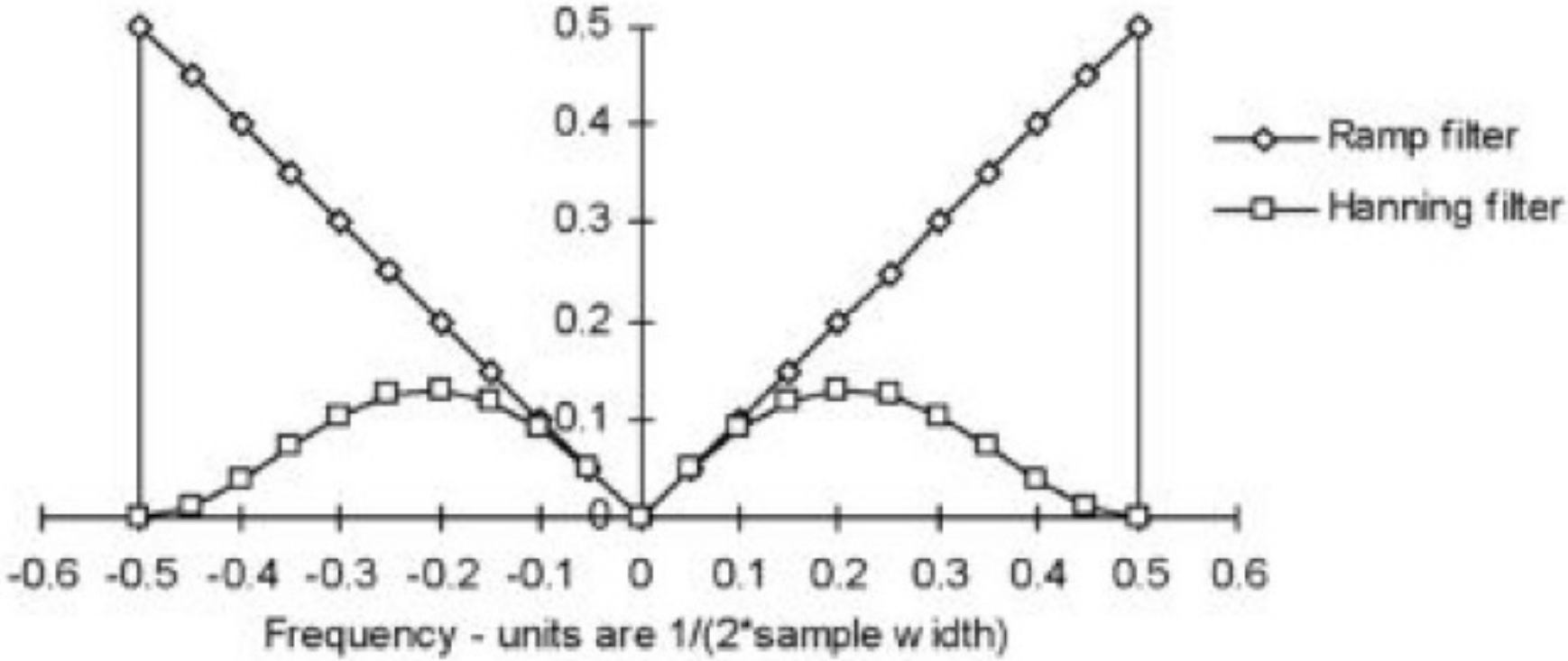
What is observed/recorded

Radon Transform

Central Slice Theorem:

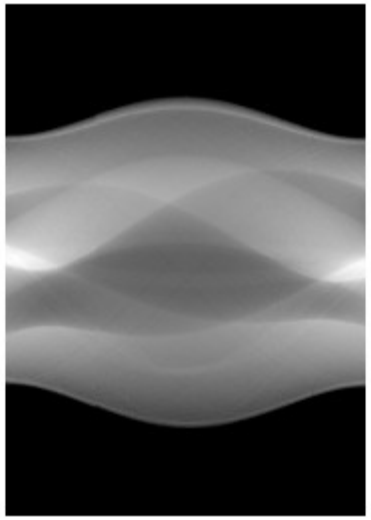
The 1D FourierTransform of the projection function P(s,ϕ) is equal to the 2D Fourier Transform of the image evaluated on the line that the projection wastaken on (the line that P(0, ϕ) was calculated from).

So we know what the 2D Fourier Transform of the image looks like (or at least what it looks like on certain lines and then interpolate), then we can take the 2D inverse Fourier Transform and have our original image.

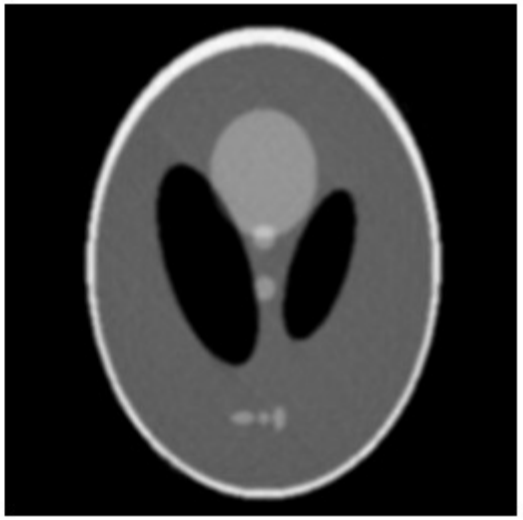

0.5
0.4
0.3
0.2
0.1
0
-0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5 0.6
Frequency - units are 1/(2*sample width)
Ramp filter
Hanning filter

Sample shows the shepp logan phantom:

Original, 256x256 8 bit image



Sinogram



Inverse Transform, scans=256, views=180, hann filter, zoom=1

This sample uses the same image, with fewer angular views: