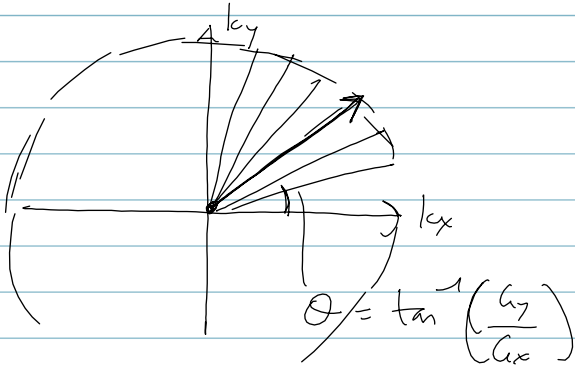
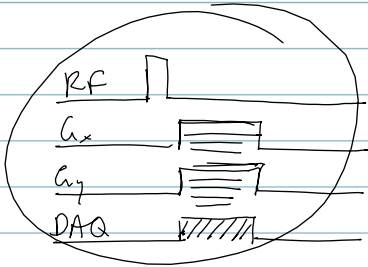


2D imaging

design $G_x(t), G_y(t)$ to adequately cover k-space

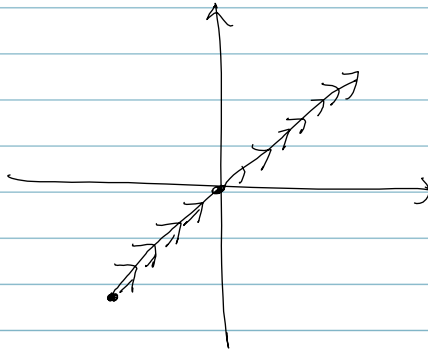
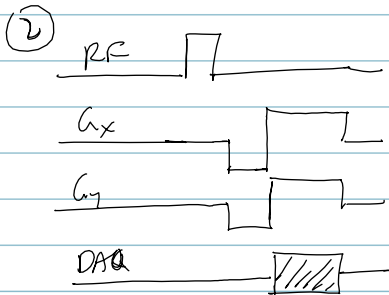
① Projection Reconstruction (PR)



$$\checkmark \begin{aligned} G_x &= G \cos \theta \\ G_y &= G \sin \theta \end{aligned}$$

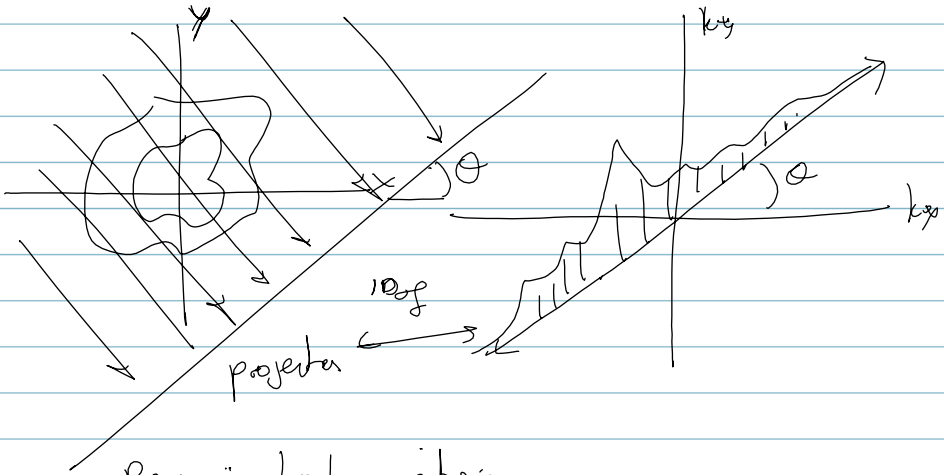
"single sided" 2D PR

$$\text{keep } \sqrt{G_x^2 + G_y^2} \text{ constant} = G$$



"full spoke" 2D PR

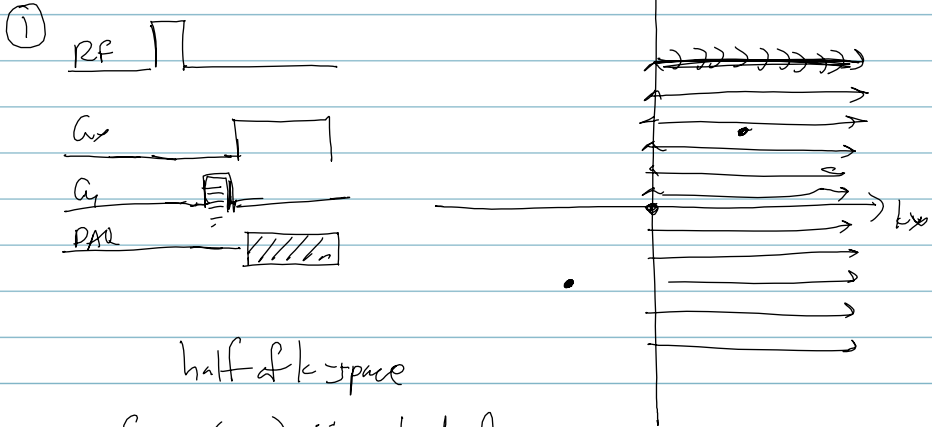
Reflect on CST



Recall: back-projection,

interpolate k-space data & \mathcal{F}^{-1}

2DFT imaging "spin warp"

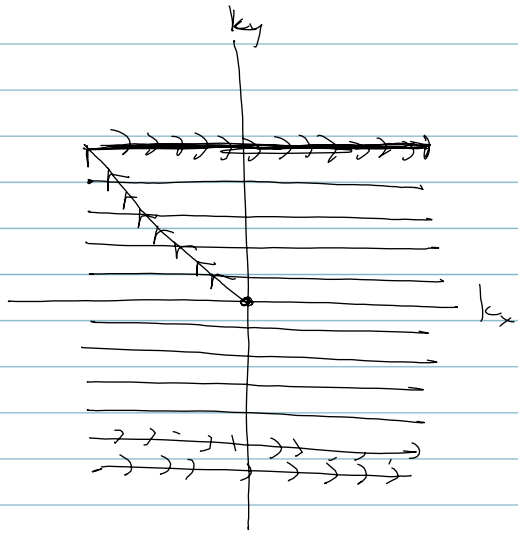
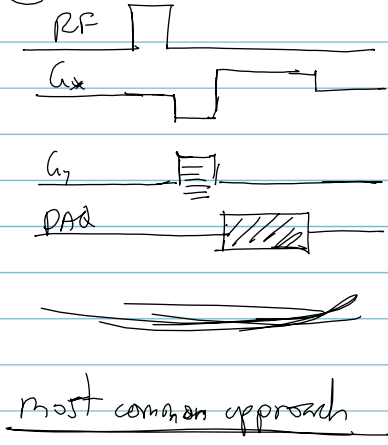


half of k-space

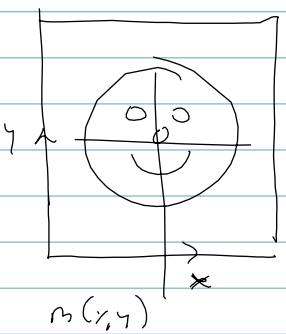
if $m(x, y)$ is real valued

$M(k_x, k_y)$ is Hermitian symmetric

②

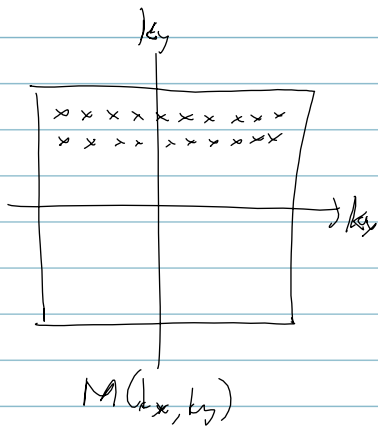


SAMPLING CONSIDERATIONS



complex valued

>



complex valued

$$\hat{M}(k_x, k_y) = M(k_x, k_y) \underbrace{S(k_x, k_y)}_{\text{Sampling function}}$$

sampled version

Sampling function

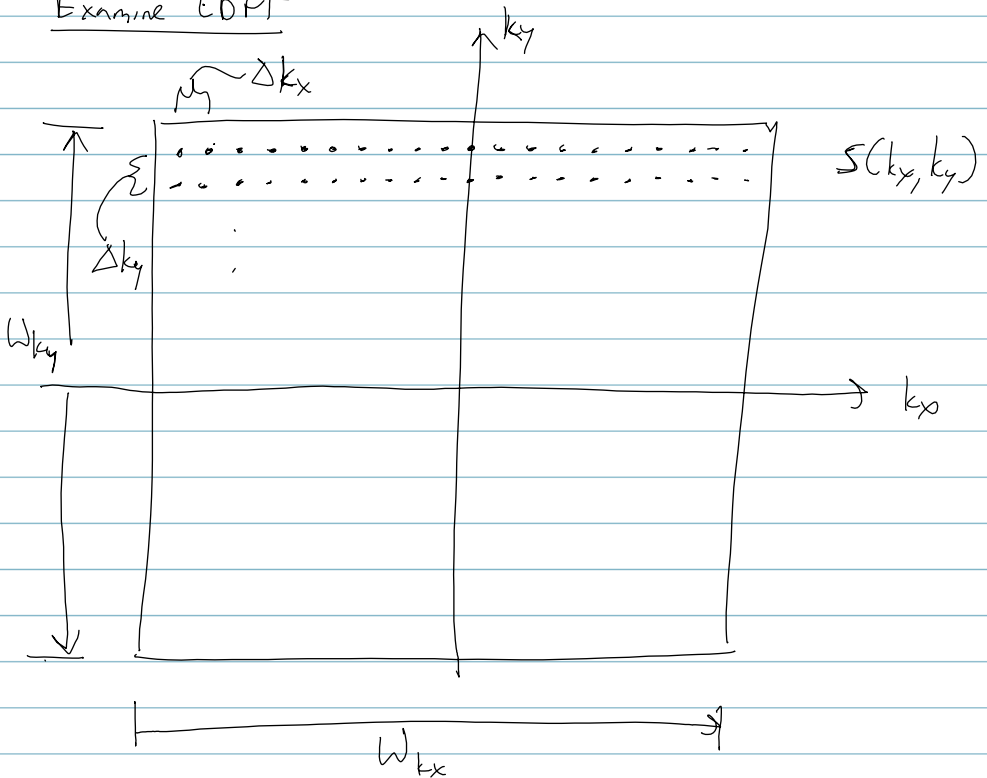
$$\sum_j \delta(k_x - k_{xj}, k_y - k_{yj})$$

$$\hat{m}(x, y) = m(x, y) ** s(x, y)$$

↑
true object

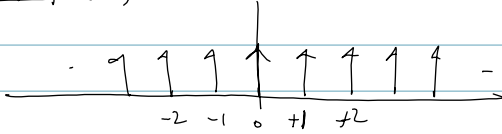
↑
inverse FT of sampling function

Examine 2DFT



"shah", "comb", "bed of nails"

$$\text{III}(x)$$



$$= \sum_{k=-\infty}^{\infty} \delta(x-k)$$

$$S(k_x, k_y) = \left(\prod \left(\frac{k_x}{\omega_{k_x}} \right) \frac{1}{\Delta k_x} \text{III} \left(\frac{k_x}{\Delta k_x} \right) \right) \cdot \left(\prod \left(\frac{k_y}{\omega_{k_y}} \right) \frac{1}{\Delta k_y} \text{III} \left(\frac{k_y}{\Delta k_y} \right) \right)$$

$$= \underbrace{\prod \left(\frac{k_x}{\omega_{k_x}}, \frac{k_y}{\omega_{k_y}} \right)}_{\text{extent}} \cdot \frac{1}{\Delta k_x \Delta k_y} \underbrace{\text{III} \left(\frac{k_x}{\Delta k_x}, \frac{k_y}{\Delta k_y} \right)}_{\text{spacing}}$$

\downarrow inv FT

