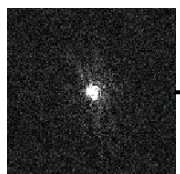


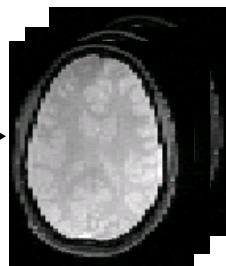
Learning based Optimization of data sampling for quantitative MRI brain mapping

Rajiv Menon

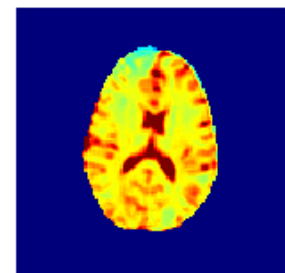
Fully sampled (3D+TSL)
Cartesian $T_{1\rho}$ brain data



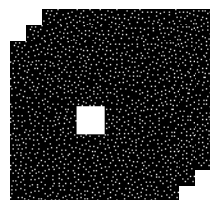
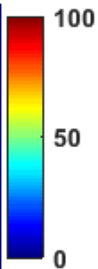
SENSE
Reconstruction



TSL=2-55ms (REF)



$T_{1\rho}$ map (REF)



Poisson Disc Sampling
AF=2-30

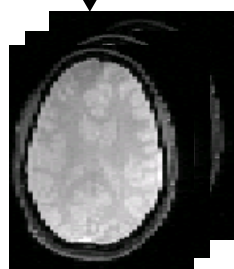
BASS Sampling Pattern Learning Algorithm



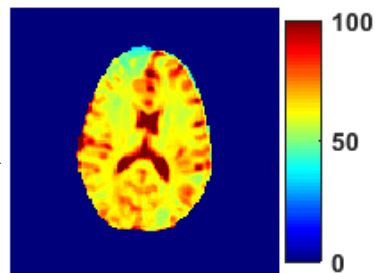
Optimized Sampling Pattern
AF=2-30

$$\hat{x} = \underset{x}{\operatorname{argmin}} \{ \|y - \text{SFC}x\|_2^2 + \lambda \|x\|_* \}$$

Low Rank reconstruction



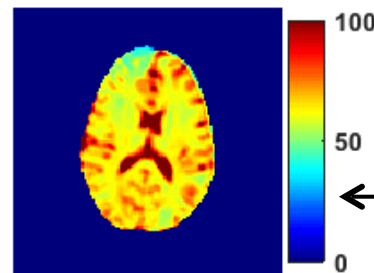
TSL=2-55ms



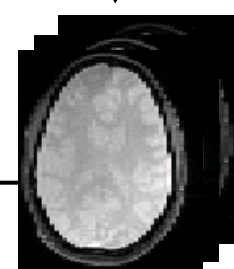
$T_{1\rho}$ map, AF=2-30

$$\hat{x} = \underset{x}{\operatorname{argmin}} \{ \|y - \text{SFC}x\|_2^2 + \lambda \|x\|_* \}$$

Low Rank reconstruction



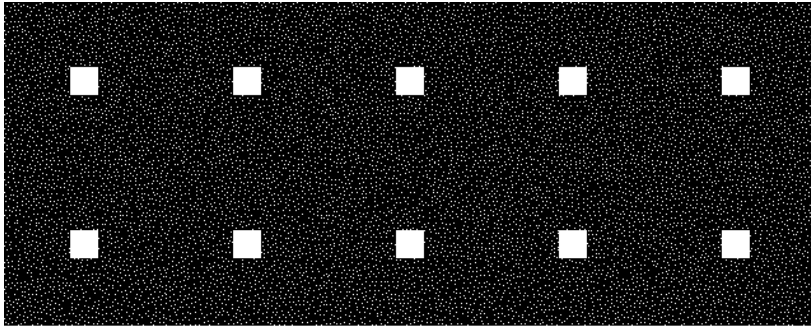
$T_{1\rho}$ map, AF=2-30



TSL=2-55ms

Poisson Disc Sampling at AF=10

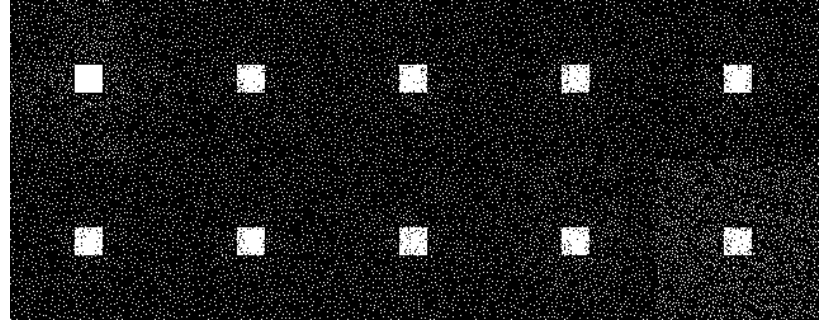
TSL=2ms 4 ms 6 ms 8 ms 10-ms



(a) 15-ms 25-ms 35-ms 45 ms 55-ms

Optimized Sampling at AF=10

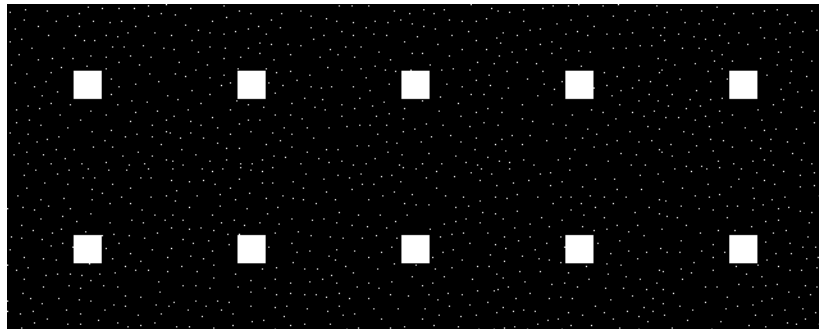
TSL=2ms 4 ms 6 ms 8 ms 10-ms



(b) 15-ms 25-ms 35-ms 45 ms 55-ms

Poisson Disc Sampling at AF=30

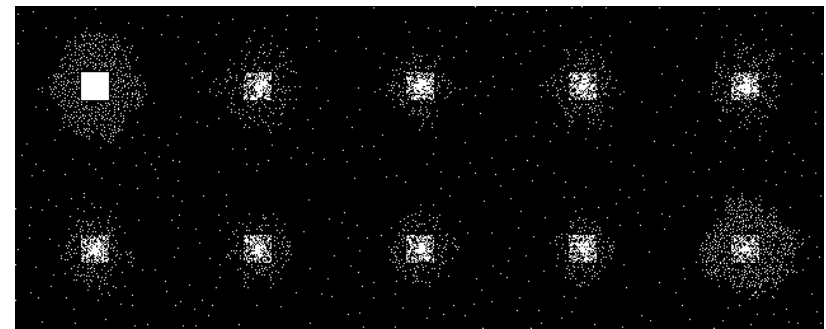
TSL=2ms 4 ms 6 ms 8 ms 10-ms



(c) 15-ms 25-ms 35-ms 45 ms 55-ms

Optimized Sampling at AF=30

TSL=2ms 4 ms 6 ms 8 ms 10-ms

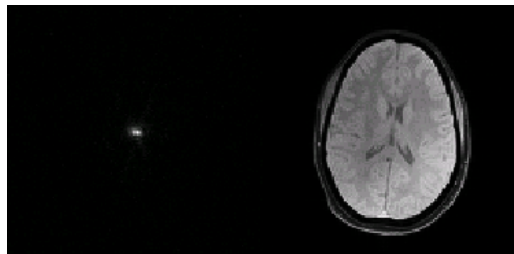


(d) 15-ms 25-ms 35-ms 45 ms 55-ms

FULL CARTESIAN SAMPLING

FS K-space

Image



(a)

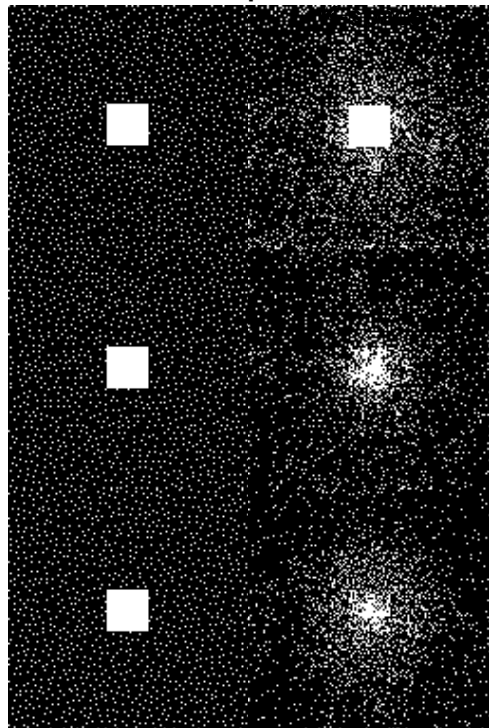
PD at AF=10 Optimized SP at AF=10

TSL=2ms

TSL=10ms

TSL=55ms

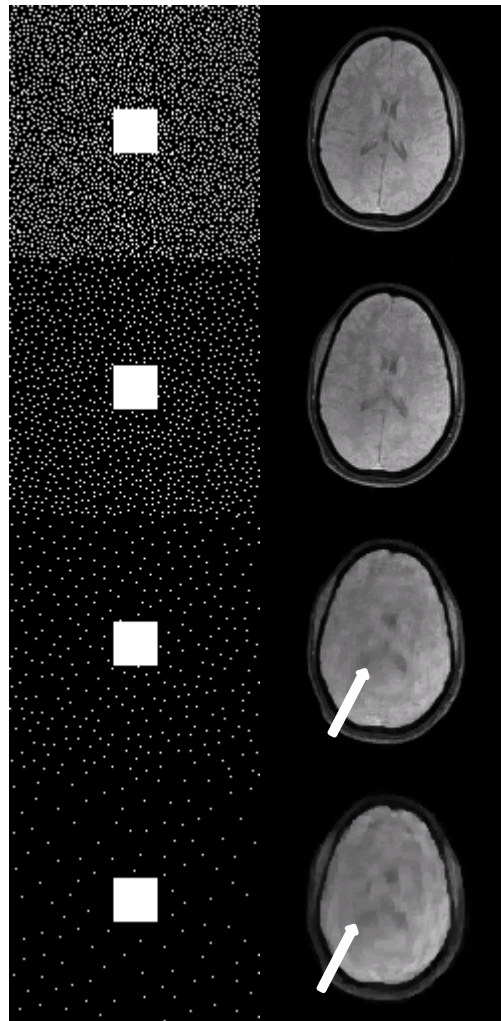
(d)



POISSON DISC UNDERSAMPLING

Under-sampled
K-space

STFD
Reconstruction



AF = 4

AF = 10

AF = 20

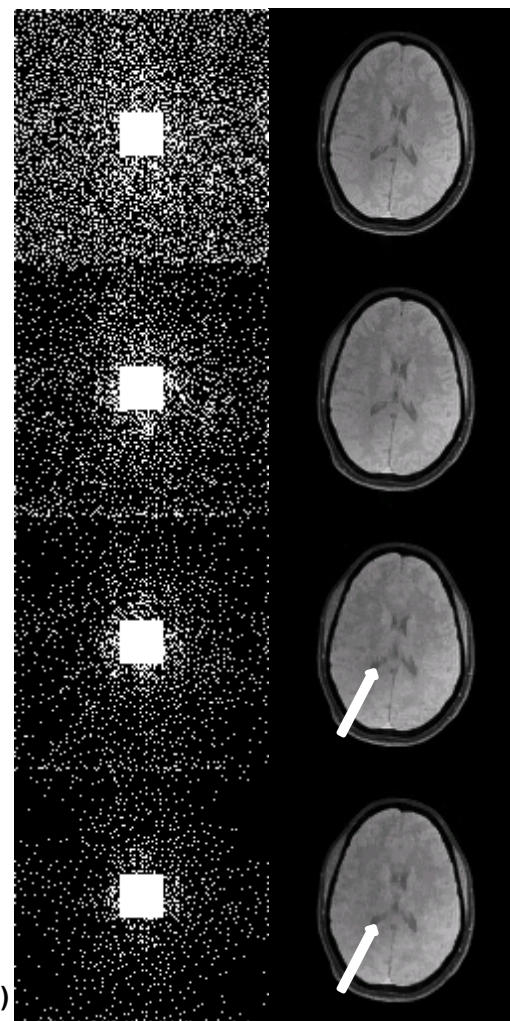
AF = 30

(b)

OPTIMIZED SAMPLING

Optimized
K-space

STFD
Reconstruction



AF = 4

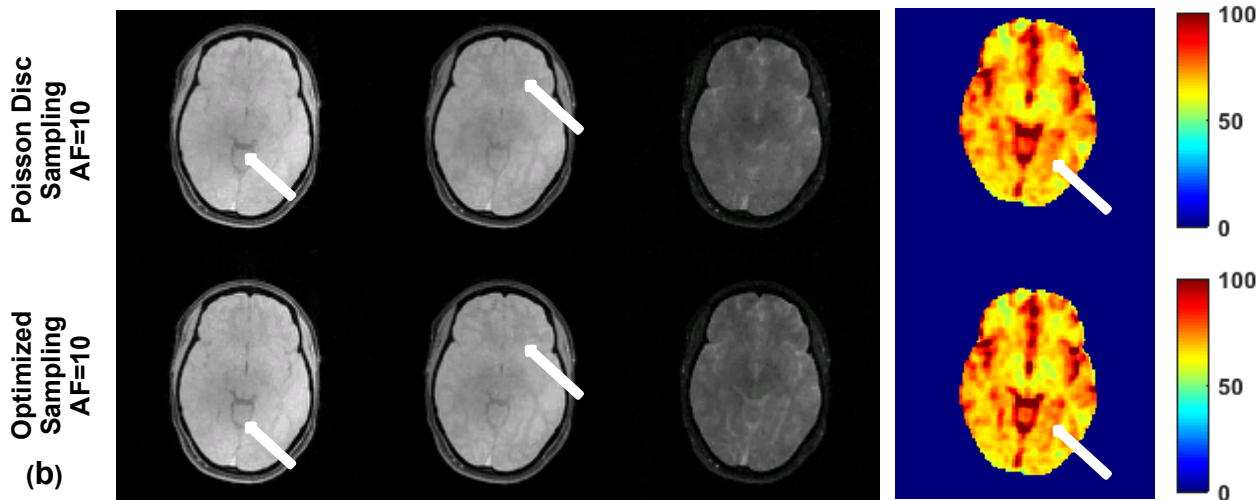
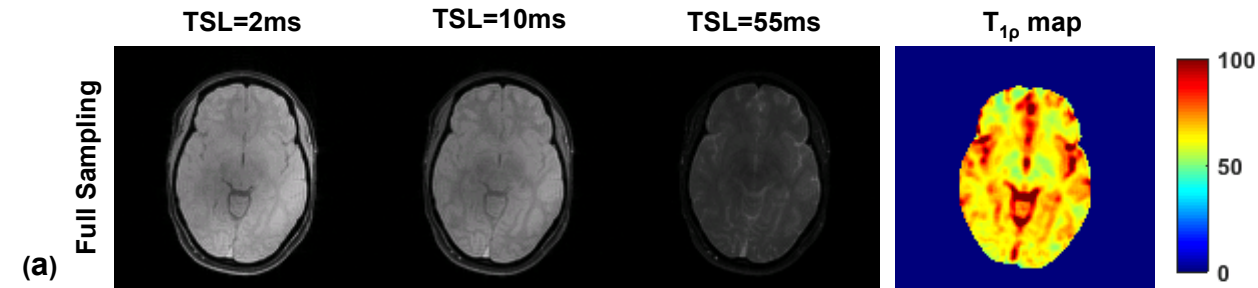
AF = 10

AF = 20

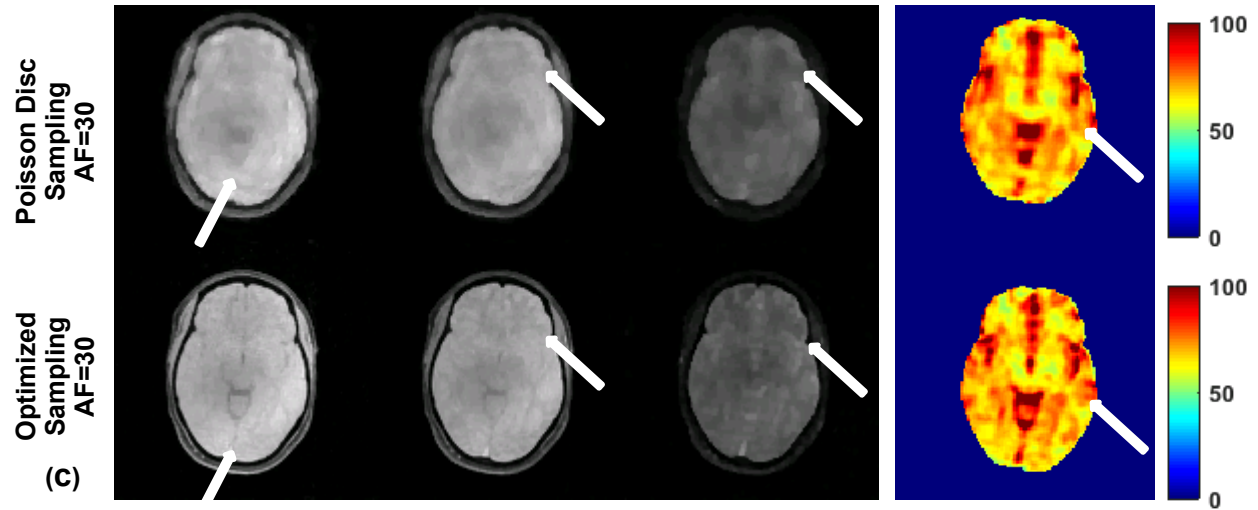
AF = 30

(c)

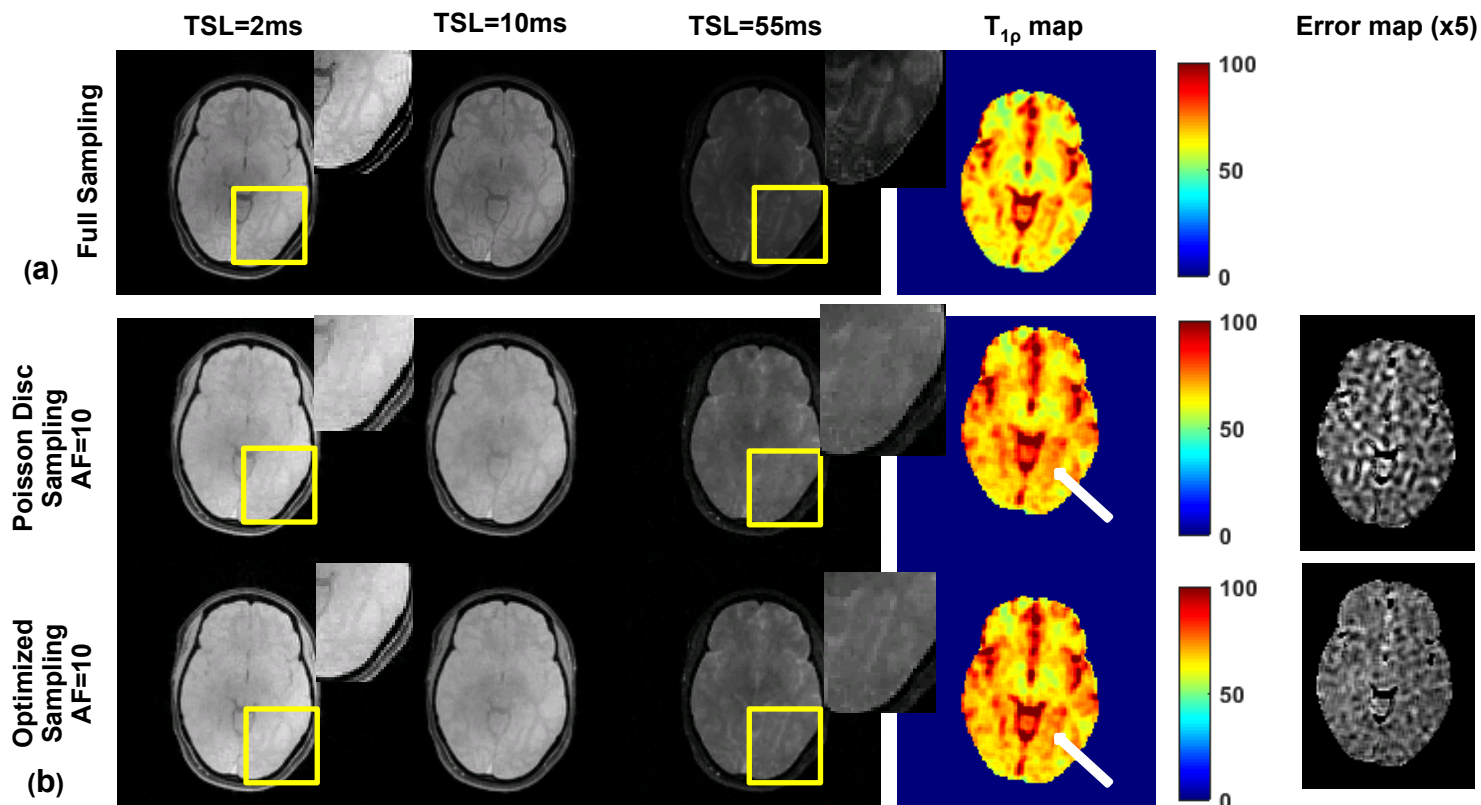
STFD



STFD



STFD



STFD

