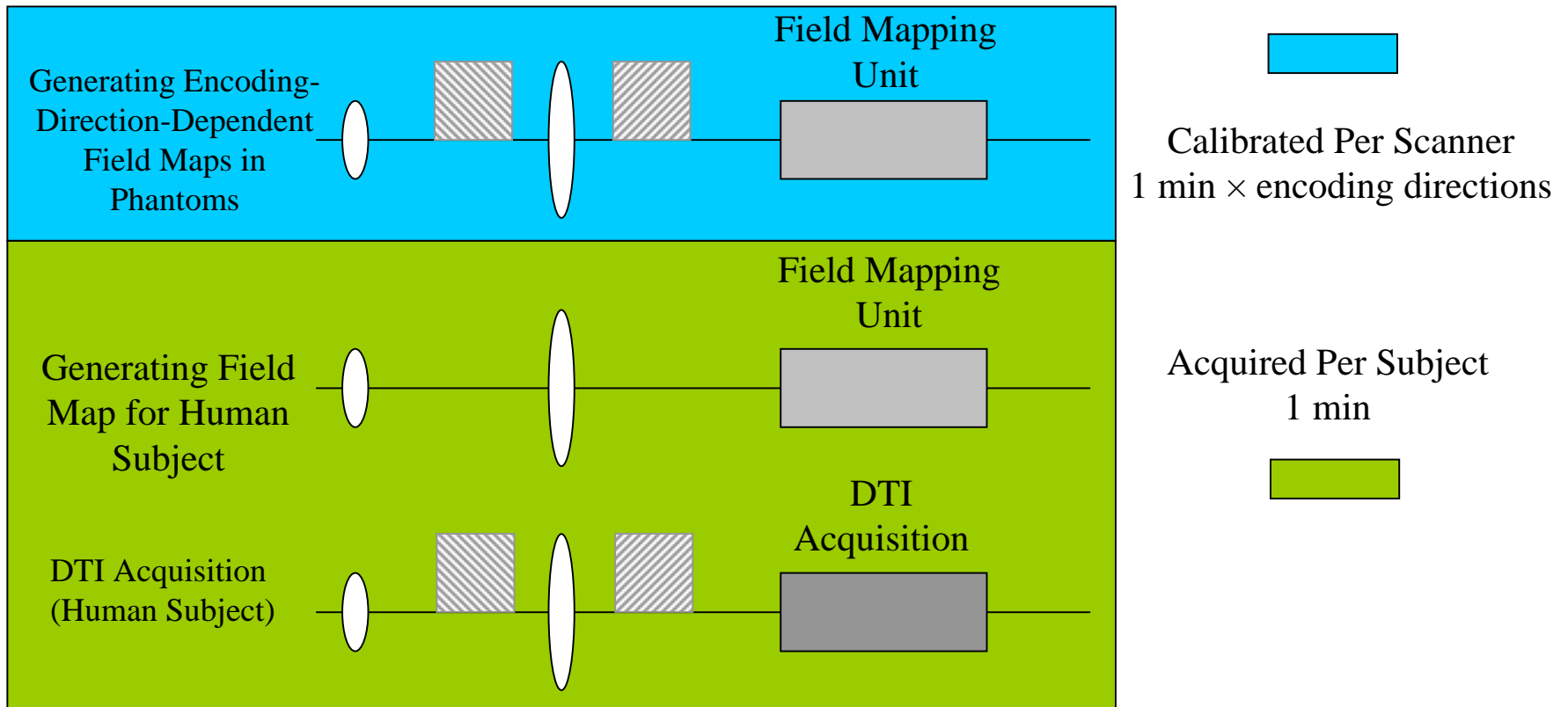


# DTI Distortion Correction

MBIRN Project 1

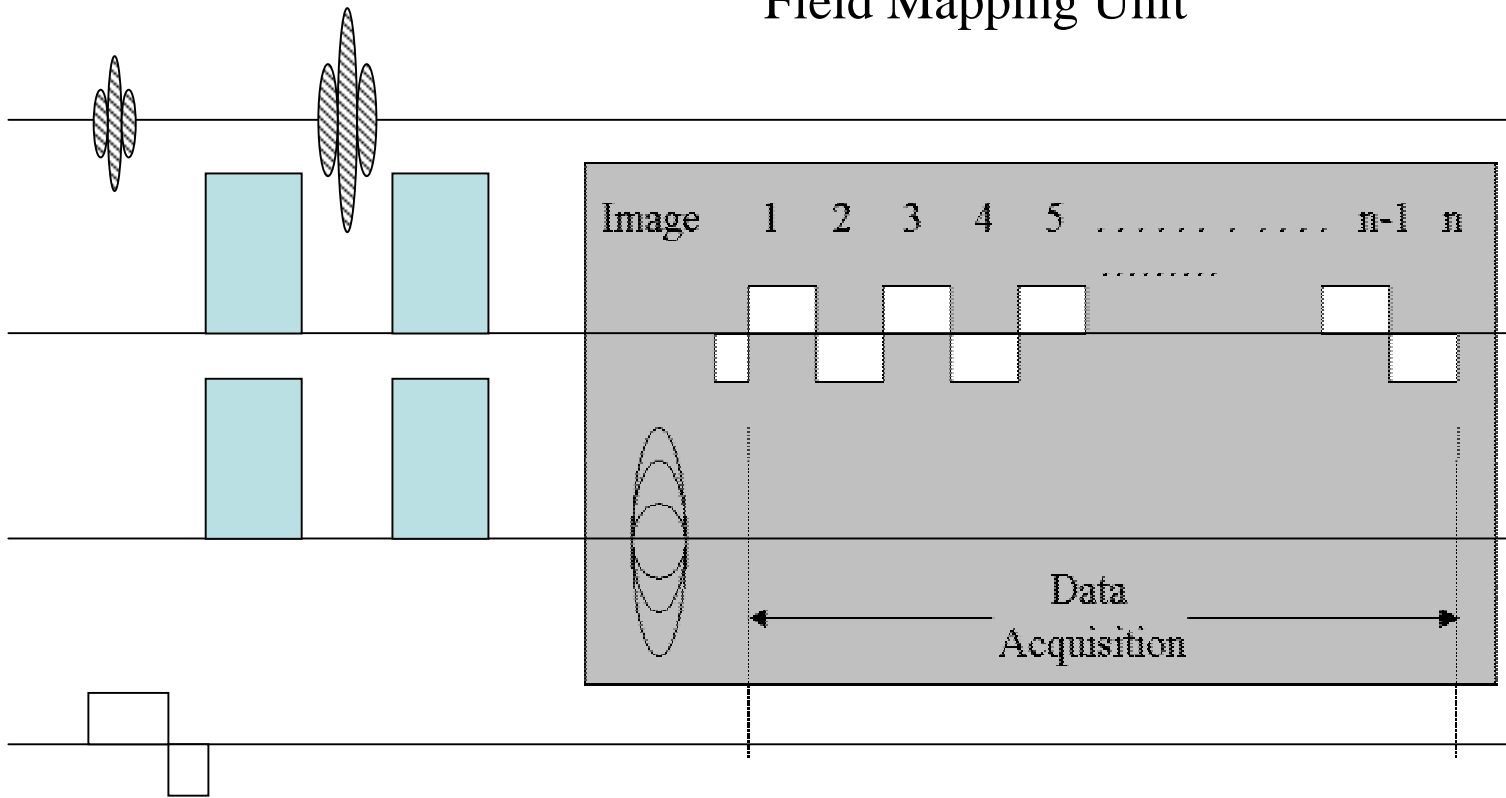


### New Field Mapping Strategy:

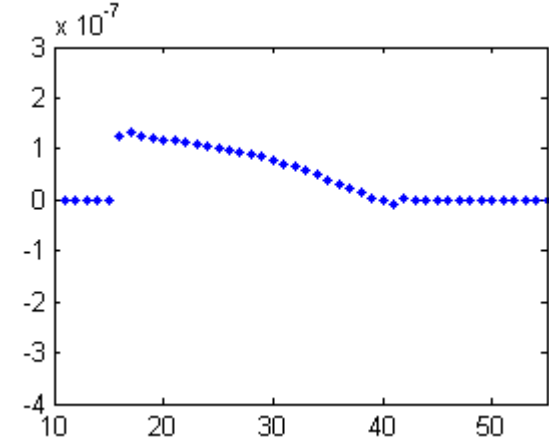
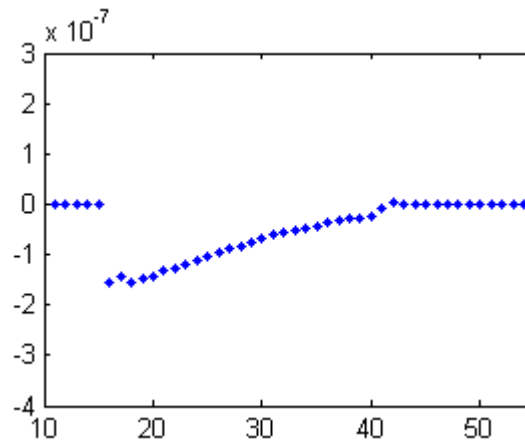
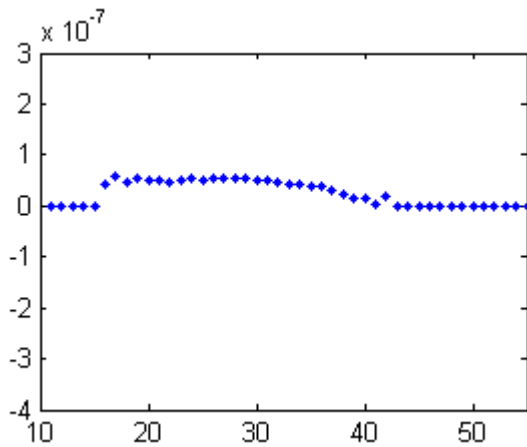
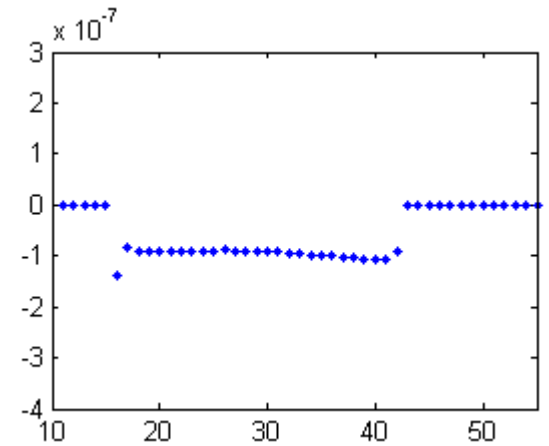
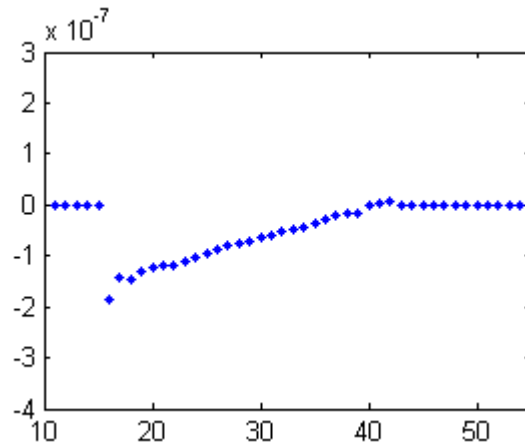
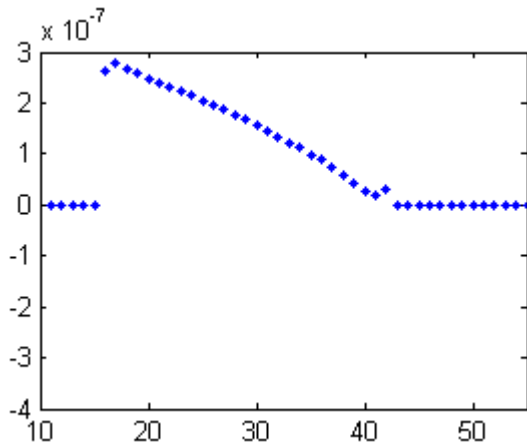
- 1) Acquired with all the diffusion gradients embedded to better map the field for DTI
- 2) Fast and distortion-free image acquisition with EPI readout train

# Schematic Illustration of the Field Mapping Unit

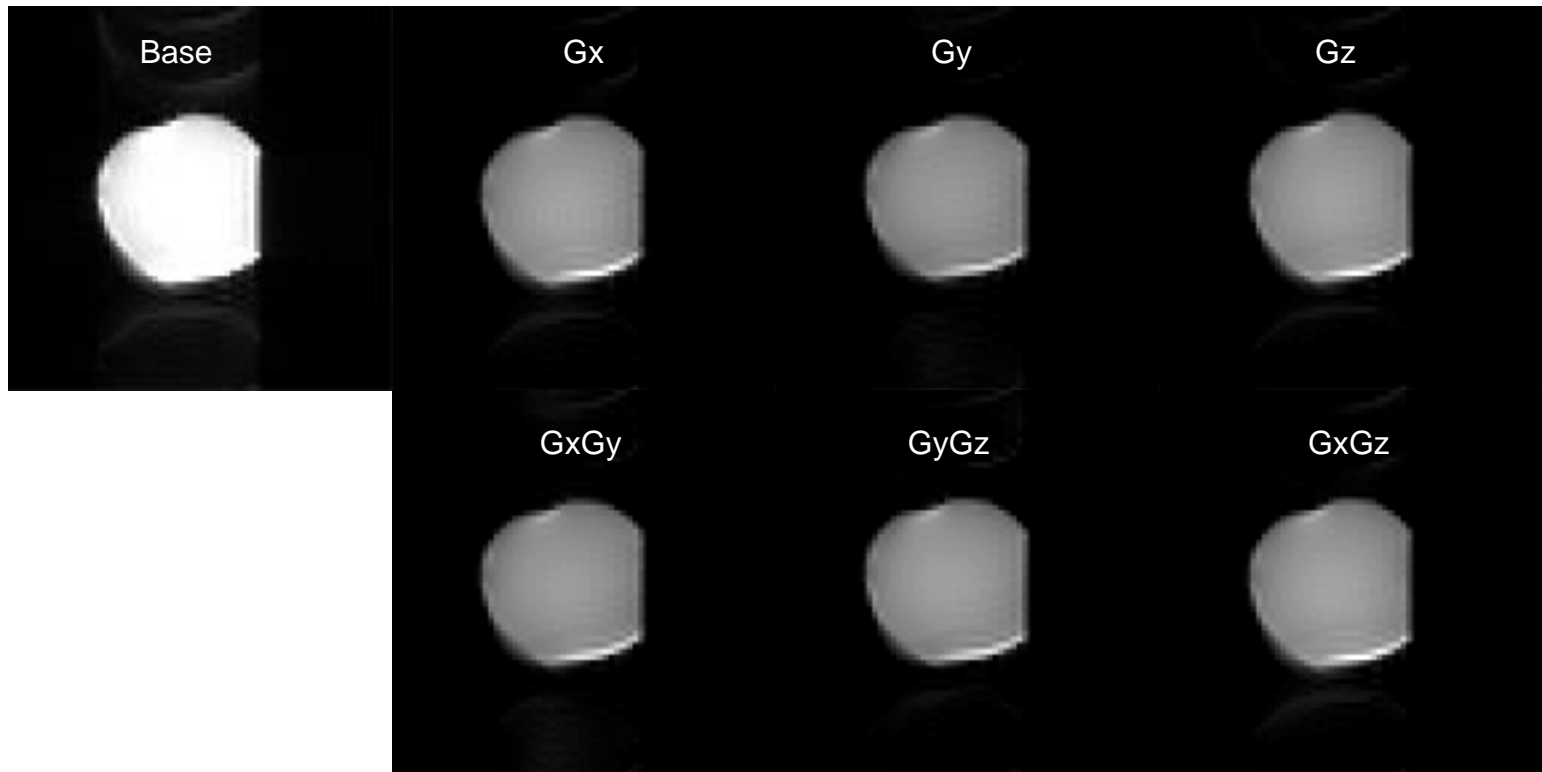
## Field Mapping Unit



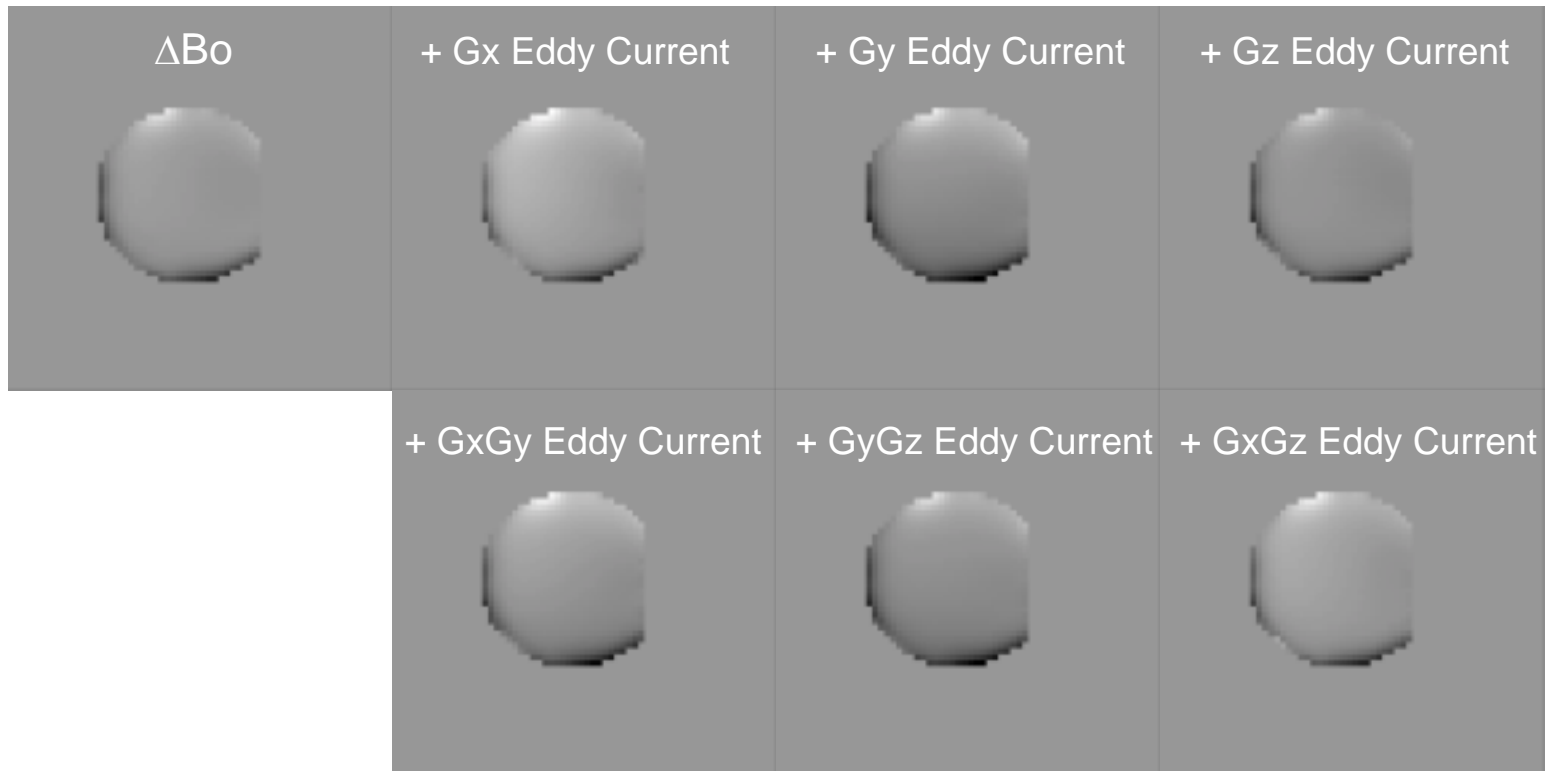
# Eddy Current Induced Field Can Be Treated As Linear Gradients



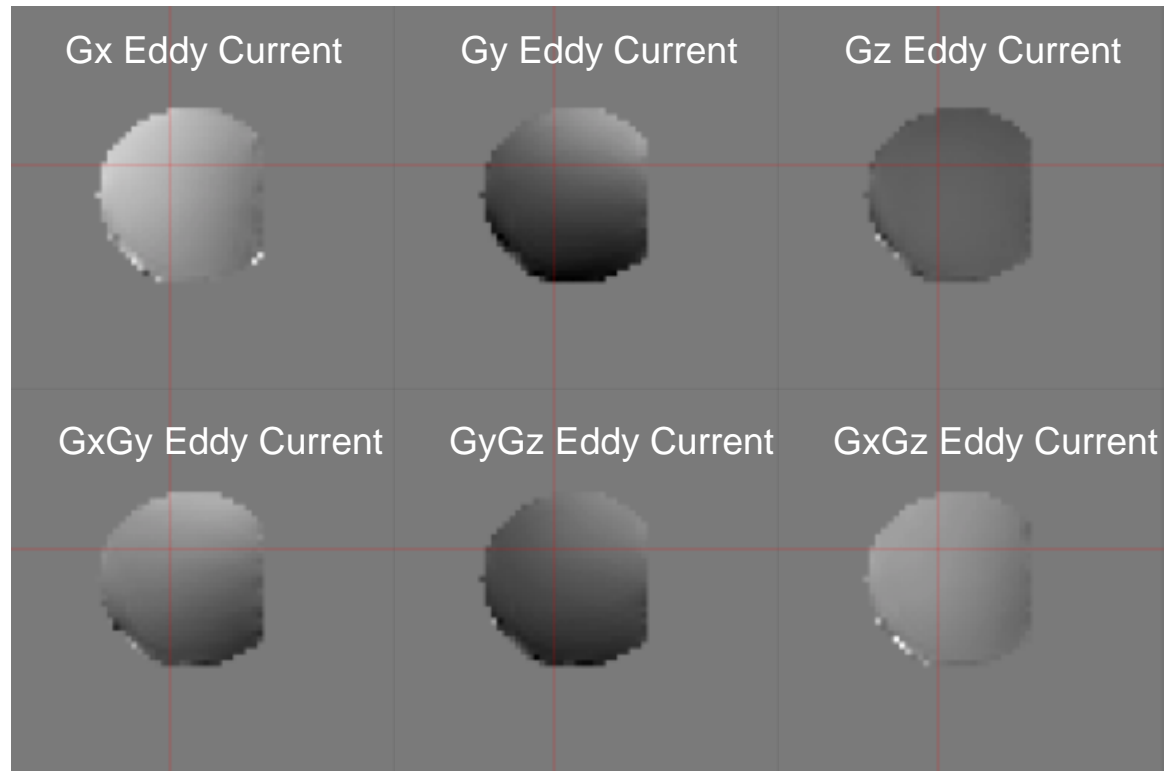
# DTI Phantom Images



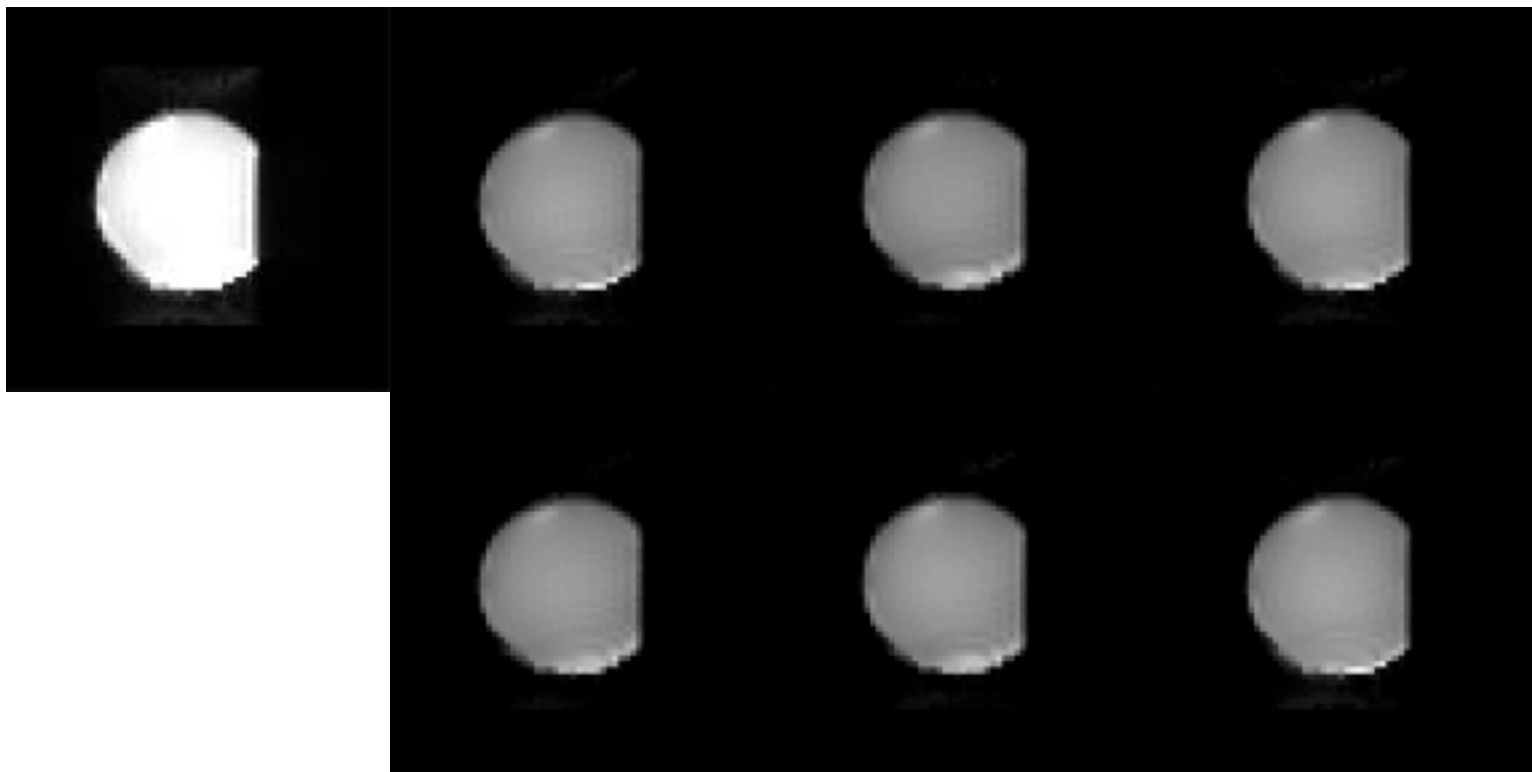
# Corresponding Composite Field Maps



# Eddy Current Induced Field Maps

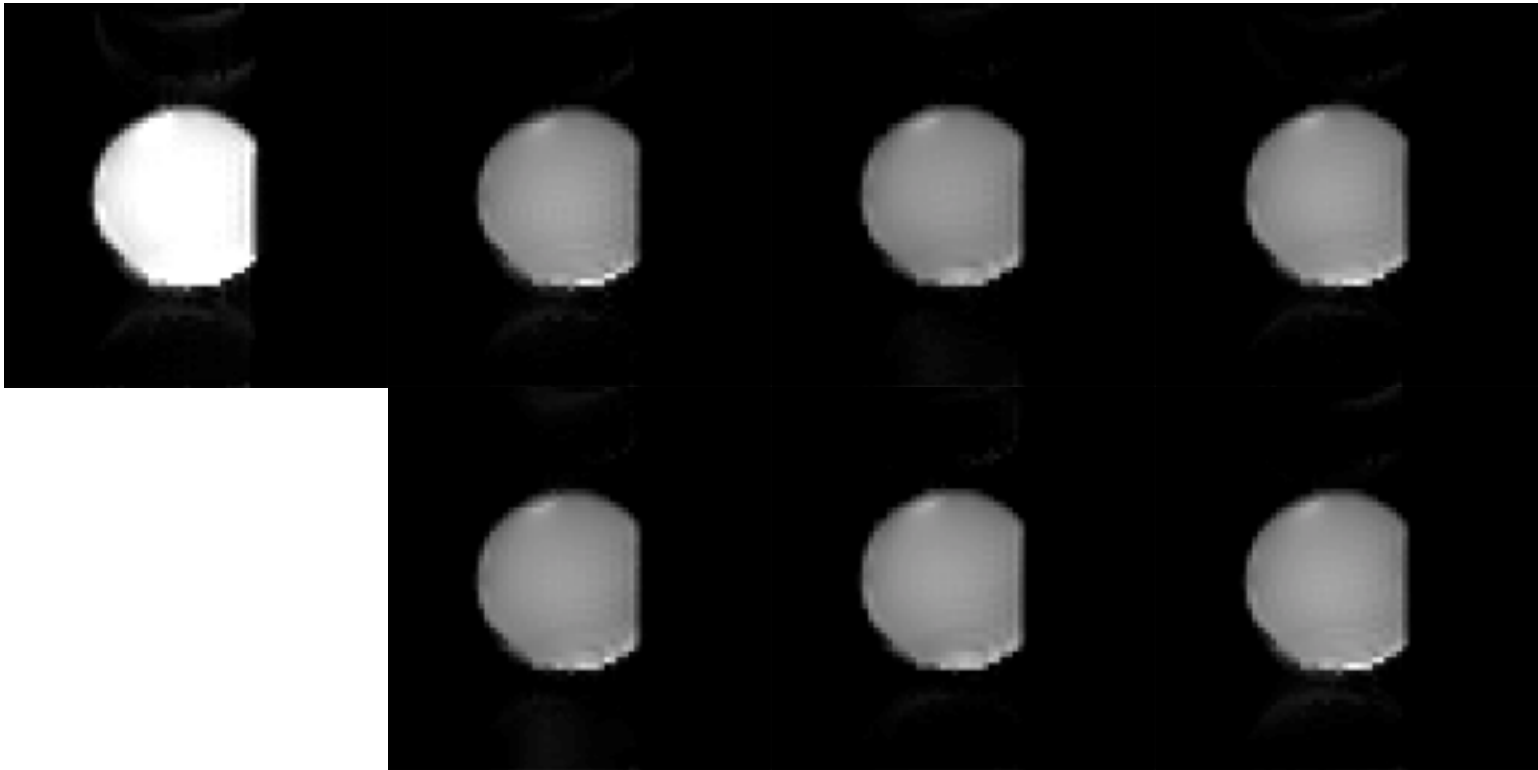


## Distortion Correction with $\Delta B_0$ only

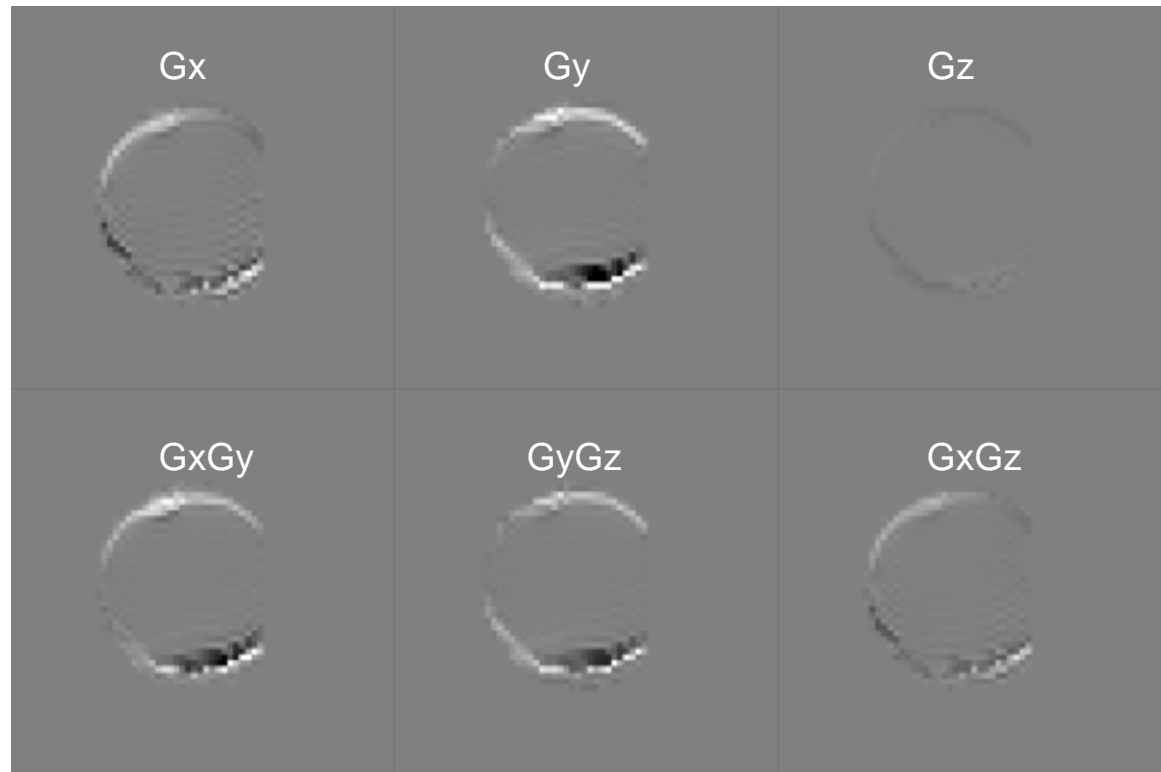




Full Correction:  $\Delta B_0$ +Eddy Current



# Difference Images Between $\Delta B_0$ only and Full Corrections



# Eddy Current Gradients

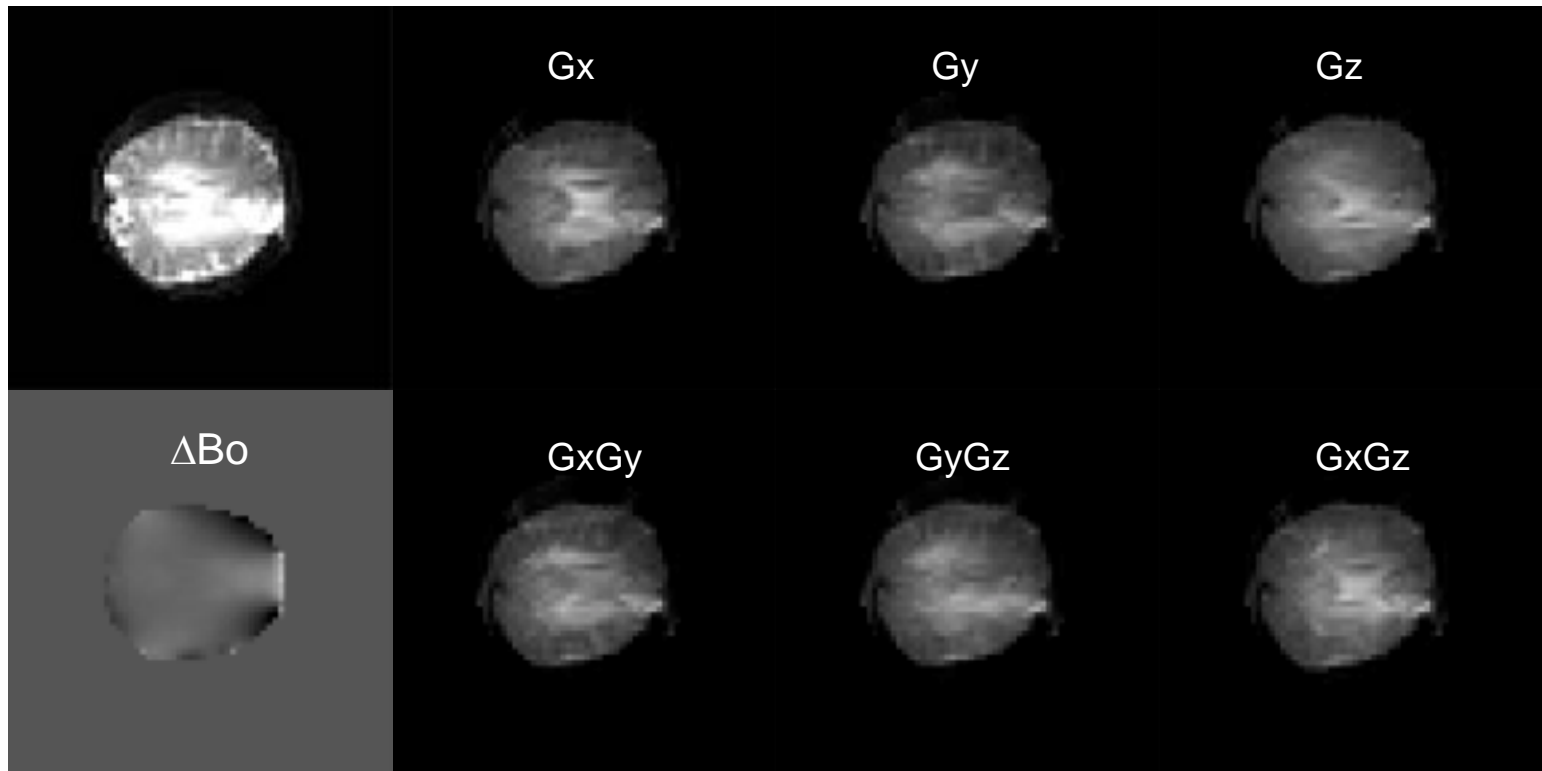
**Table 1:** Eddy current gradients at frequency and phase directions and the shearing and scaling pixels across an image

DWI	Diffusion Scheme			Frequency (1E-5 gauss/cm)	Phase (1E-5 gauss/cm)	Shear (pixels)	Scale (pixels)
	X	Y	Z				
b1	1	0	0	-0.2255	-0.0967	-1.3841	-0.5937
b2	0	1	0	0.0612	-0.2822	0.3755	-1.7327
b3	0	0	1	-0.0273	0.0151	-0.1679	0.0929
b4	0.7	0.7	0	-0.0837	-0.2365	-0.5137	-1.4521
b5	0	0.7	0.7	0.0681	-0.1910	0.4181	-1.1723
b6	0.7	0	0.7	-0.1425	-0.0599	-0.8751	-0.3678

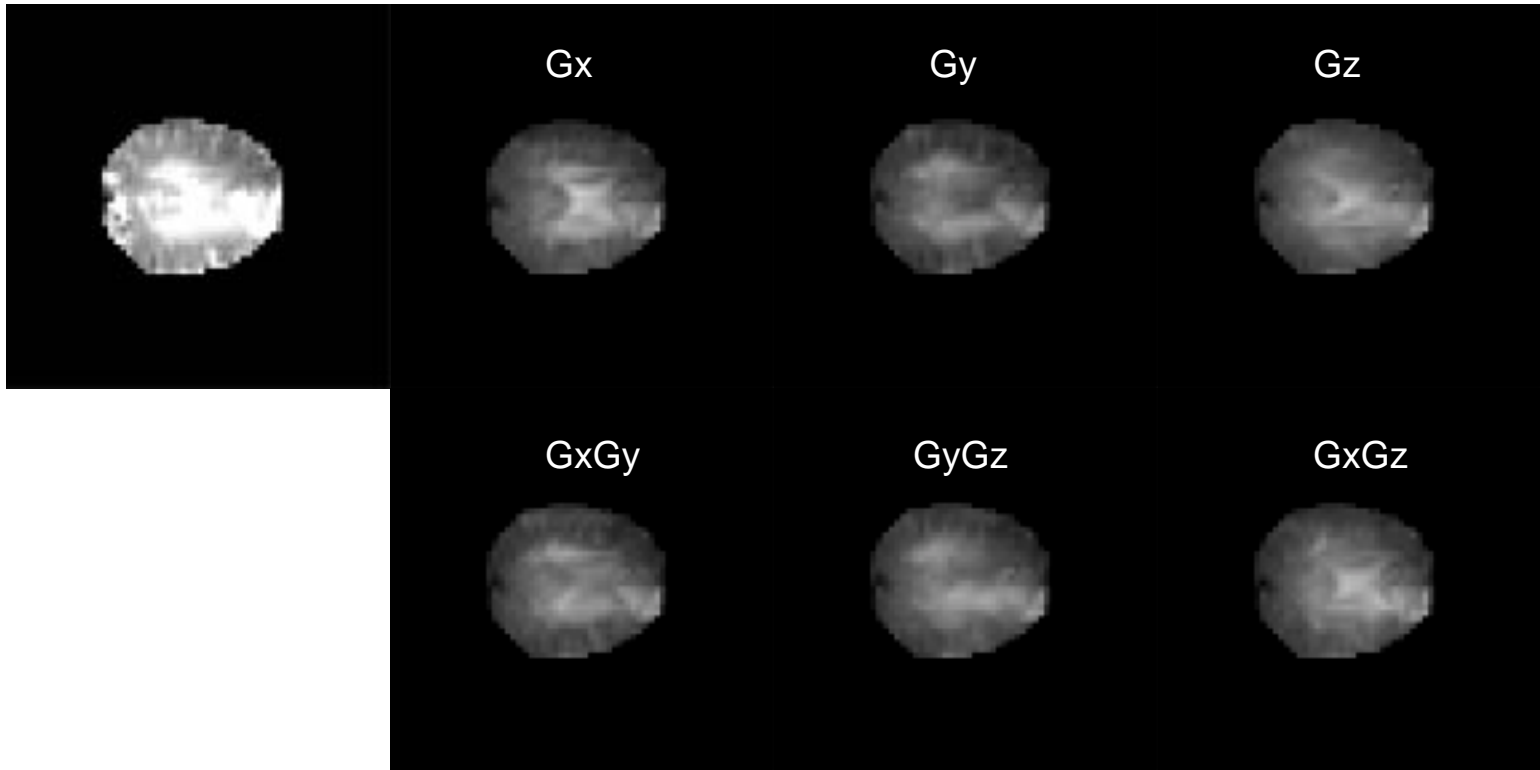
\* negative value means the shear is counter clockwise, or scale is to compress the image

\* positive value means the shear is clockwise, or scale is to stretch the image

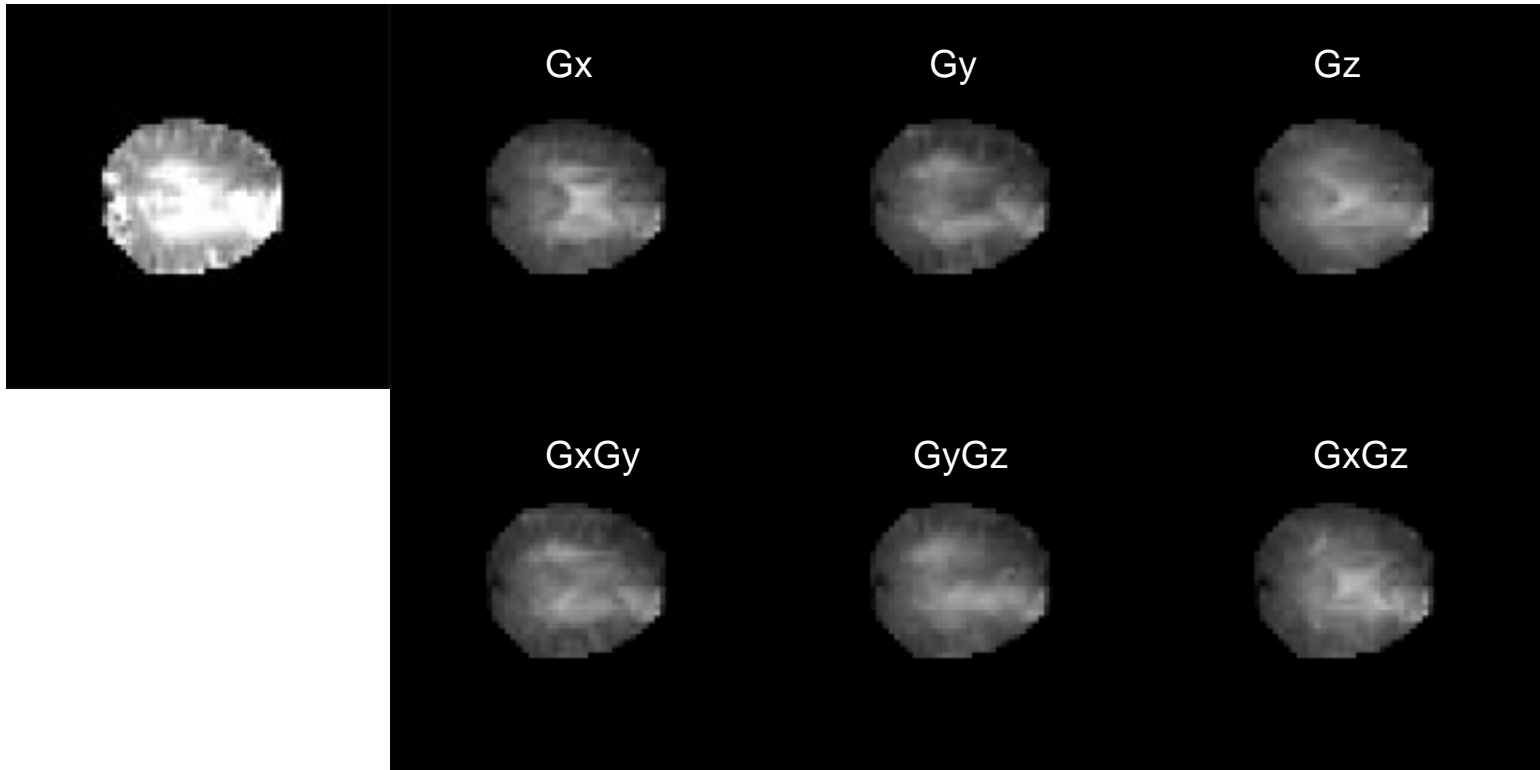
# DTI Human Images



# Correction with $\Delta B_0$ only



# Full Correction: $\Delta B_0$ +Eddy Current



# Difference Images Between $\Delta B_0$ only and Full Corrections

