

## NC Fast MRI Background

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I. voxels : cubic volumes that span the 3D space of the brain, corresponding to a **spacial location**.

- Time series of the intensities of a single voxel —> waves

### II. BOLD fMRI

- Blood Oxygenation Level Dependent —> signal
- measures the ratio of oxygenated to deoxygenated hemoglobin in the blood
- measures the metabolic demands of active neurons —> neuronal activity
- changes in the fMRI signal triggered by neuronal activity —> HRF : intensity

### III. fMRI data

- scan in axial slices
- field of view : FOV
- slice thickness, FOV/ matrix size —> voxel size
- experiment > subjects > session > run > volume > slice > voxel

### IV. k-space

- Each point in k-space gives us one of these waves;
- Value of the point in k-space tells us the relative contribution of that wave in reconstructing image.

1. Low spacial frequencies —> parts of the objects change slow in a spacial manner : Contrast
2. High spacial frequencies —> small structures whose size is on the same order as the voxel size : Tissue boundaries

### V. noise

- thermal motion of free electrons
- gradient and magnetic field instability
- head movement and interactions with magnetic field
- physiological effects, including heartbeat and respiration

appear in data as: (—> modification)

1. high-frequency 'spikes'
2. image artifacts and distortions
3. for-frequency drift and periodic fluctuation over time

