Single Shot Spiral TSE

J.Hennig

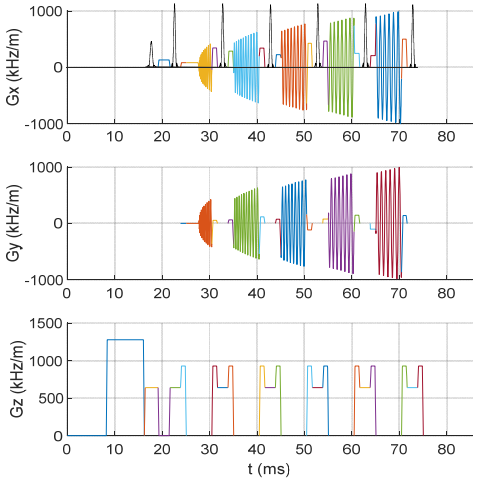
Dept.of Radiology, Medical Physics

Declaration of Financial Interests or Relationships

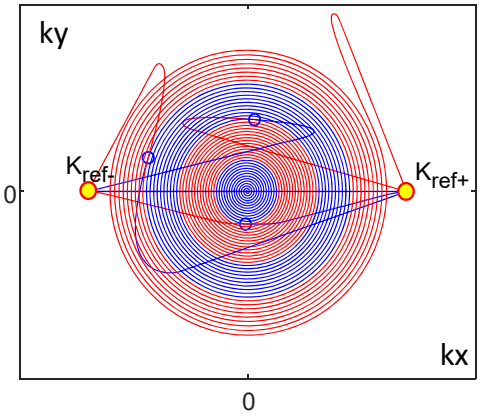
Speaker Name: Hennig

I have no financial interests or relationships to disclose with regard to the subject matter of this presentation.

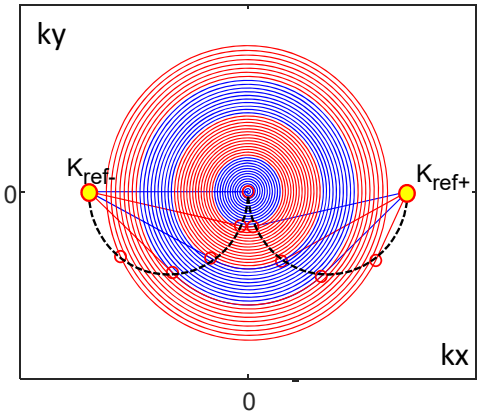
Single Shot spiralTSE with Annulated Segmentation



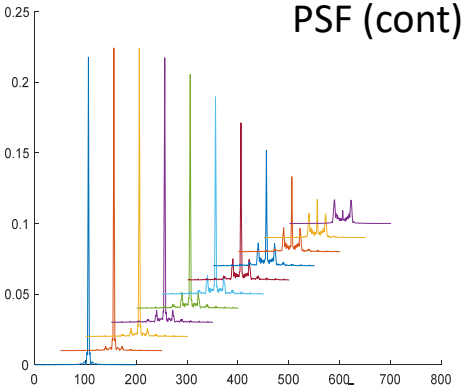
fixed mode



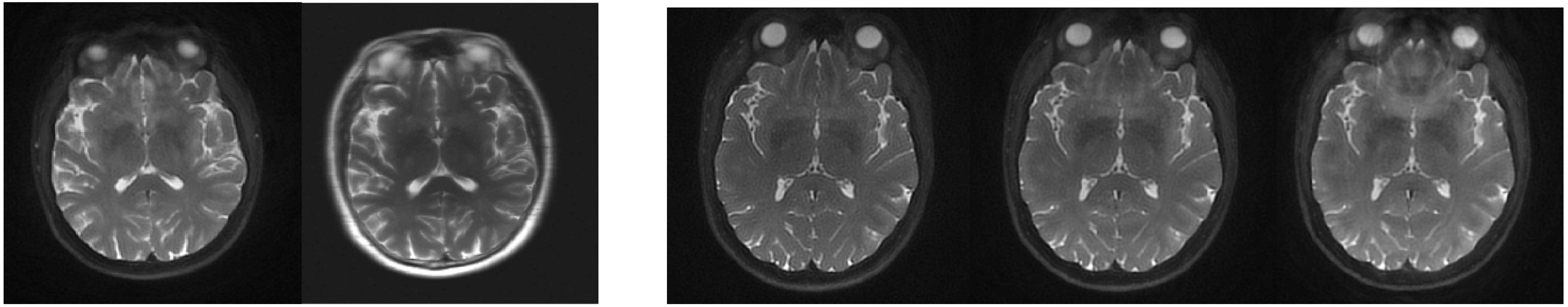
tangential mode.



PSF (cont)



spiralTSE HASTE ESP 8 10 16 ms



https://github.com/HennigJue/single-shot-spiral-TSE

Hennig J, Barghoorn A, Zhang S, Zaitsev M (2022) Single shot spiral TSE with annulated segmentation. Magnetic Resonance in Medicine 88:651–662.

Block W, Pauly J, Nishimura D (1997) RARE spiral T2-weighted imaging. Magnetic Resonance in Medicine 37:582–590.

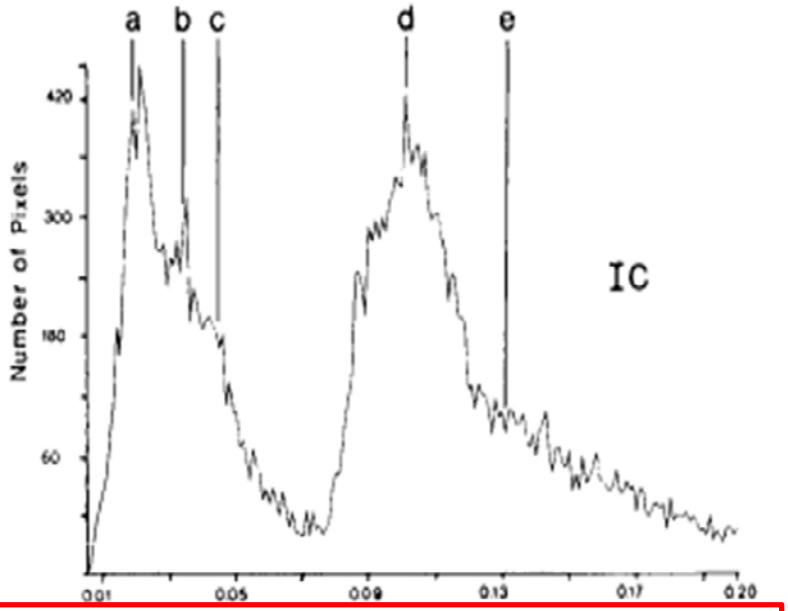
Wang Z, Allen SP, Feng X, Mugler III JP, Meyer CH (2022) SPRING-RIO TSE: 2D T2-Weighted Turbo Spin-Echo brain imaging using SPiral RINGs with retraced in/out trajectories. MRM 88:601–616.

Hot Topics In The Early 1980s: Quantitative MRI

CATEGORY 1: APPROACHES TO TISSUE CHARACTERISATION

Invited Symposium Papers

Contributed Papers



(Single valued) T1- and T2- values do **NOT** represent tissue properties.
Tissues are characterized by spectra of different T1s and T2s.
Measured values depend on the way they are measured and are affected by other mechanisms like chemical exchange, magnetization transfer, diffusion, J-coupling,…

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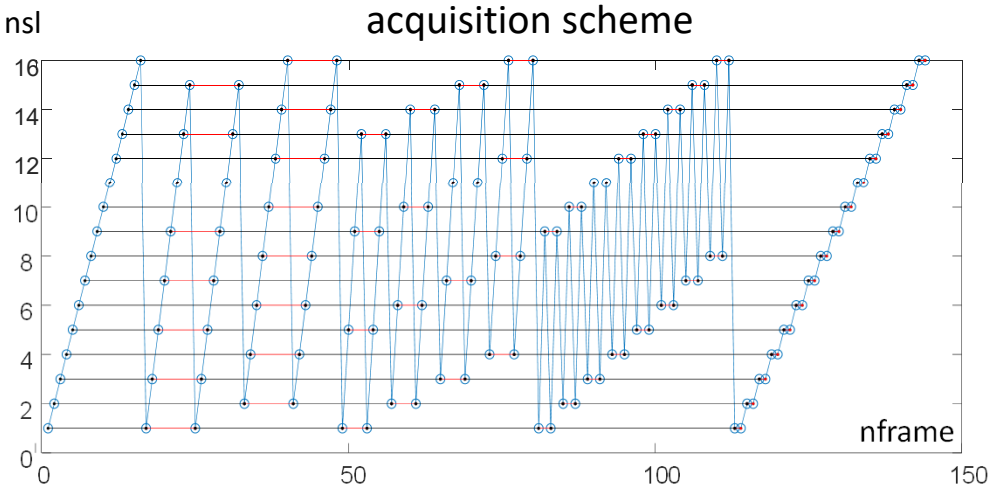
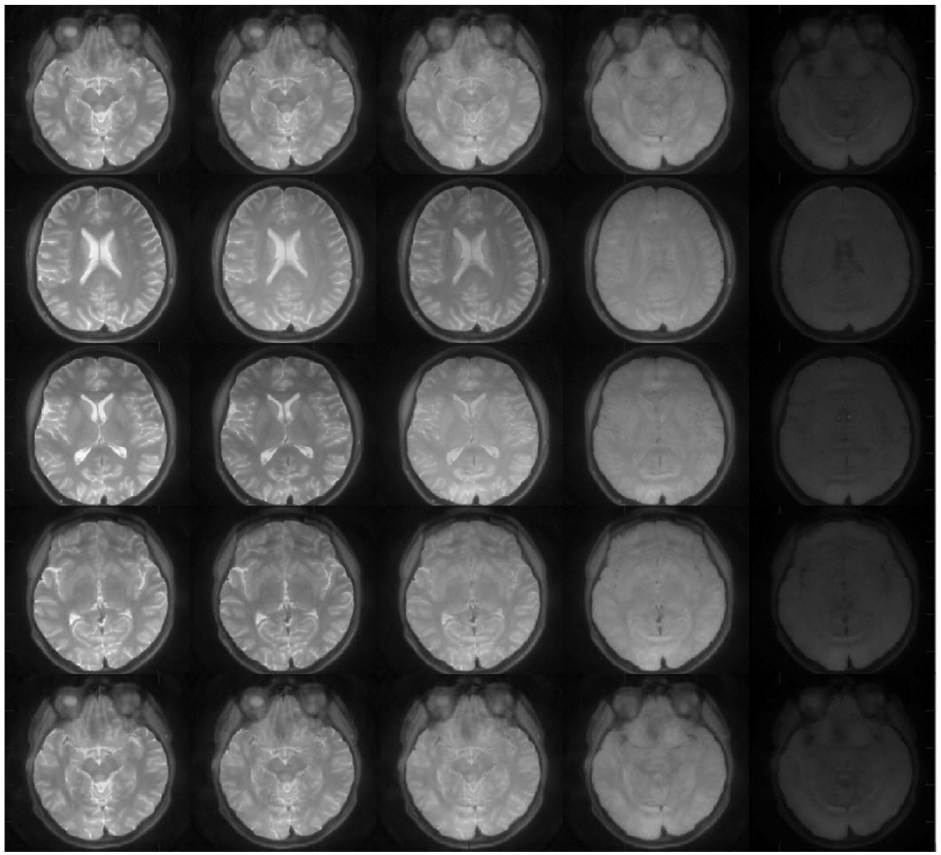
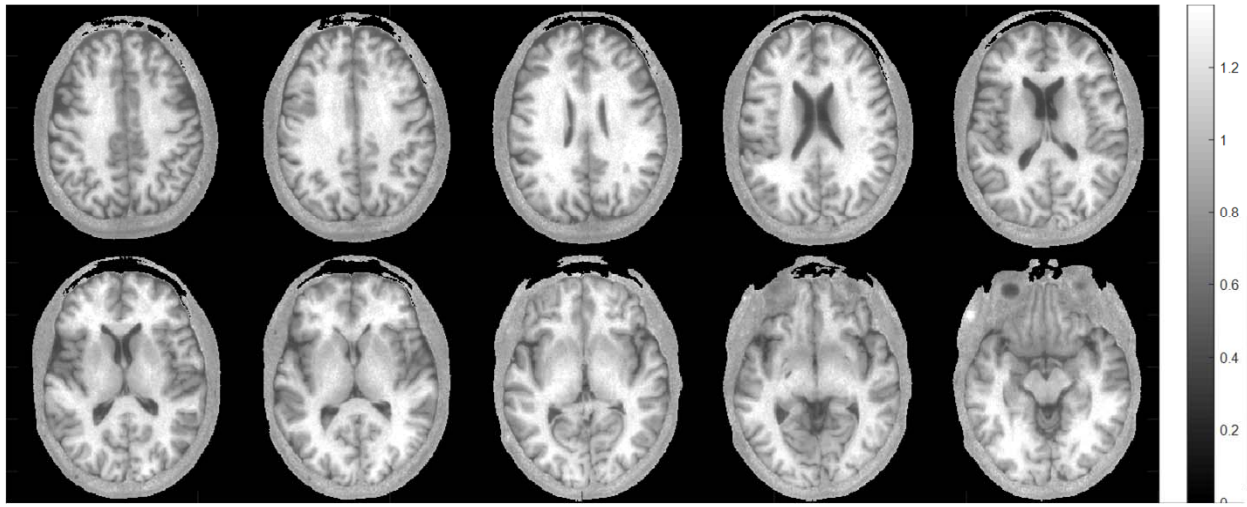
Parametric Imaging with Single Shot spiralTSE: T1

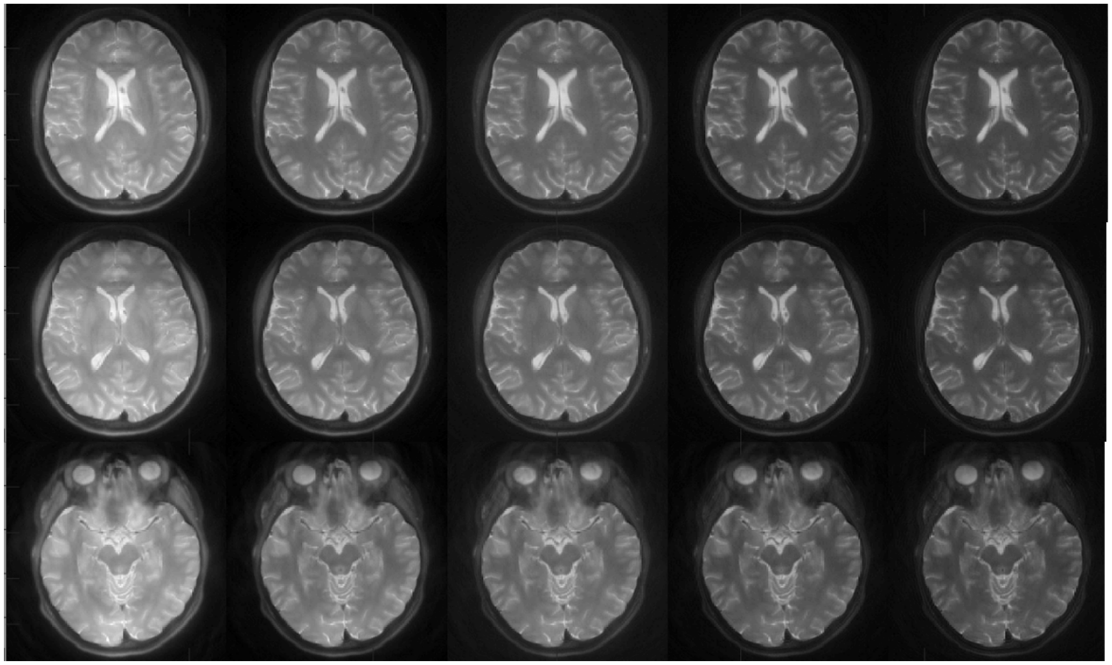


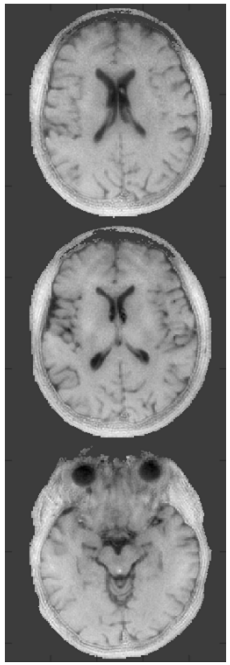
For 16 slices acquisition is performed such, that each slice is acquired with 9 different TRs. Total number of frames =144 acquired in ~ 36s.

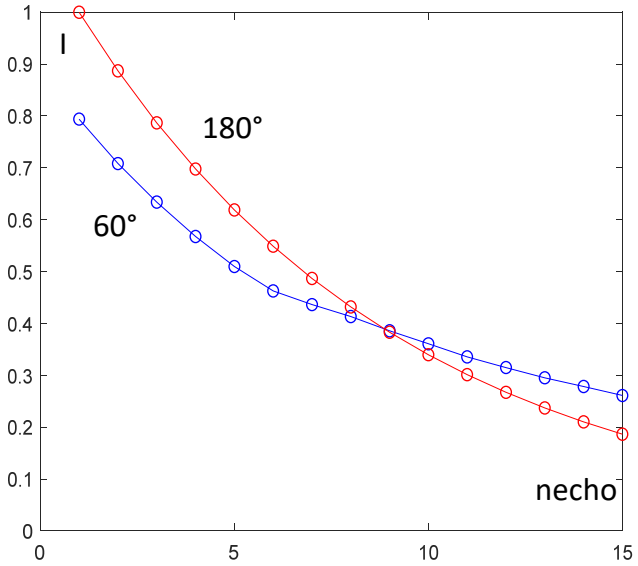




Parametric Imaging with Single Shot spiralTSE: T2





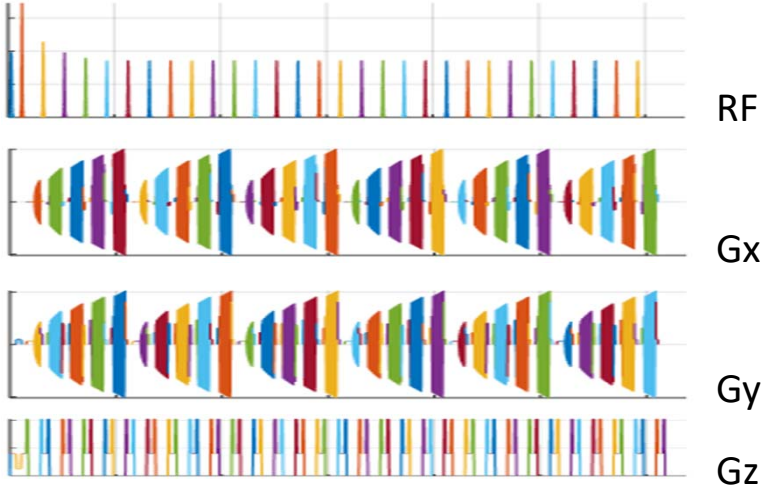


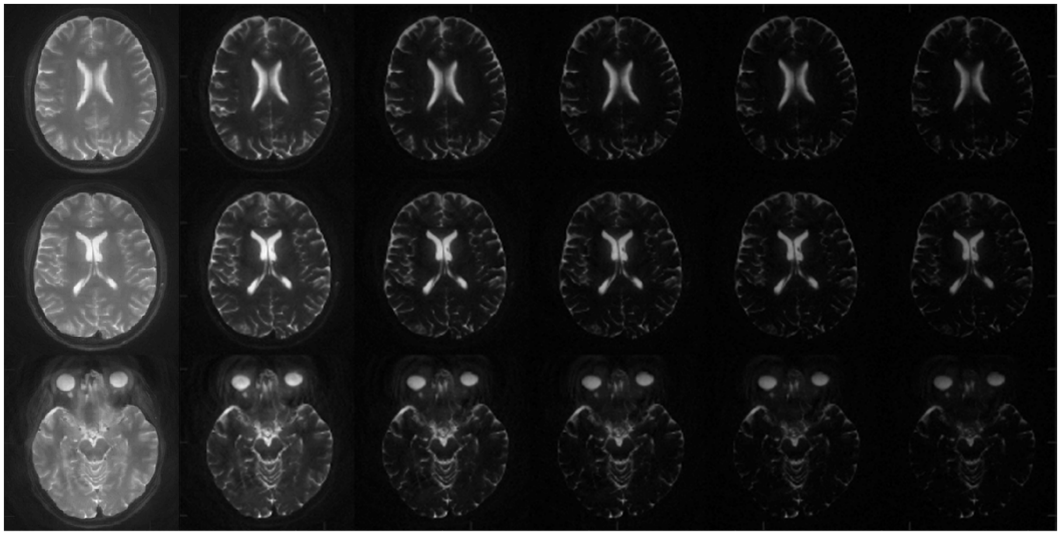
todo:

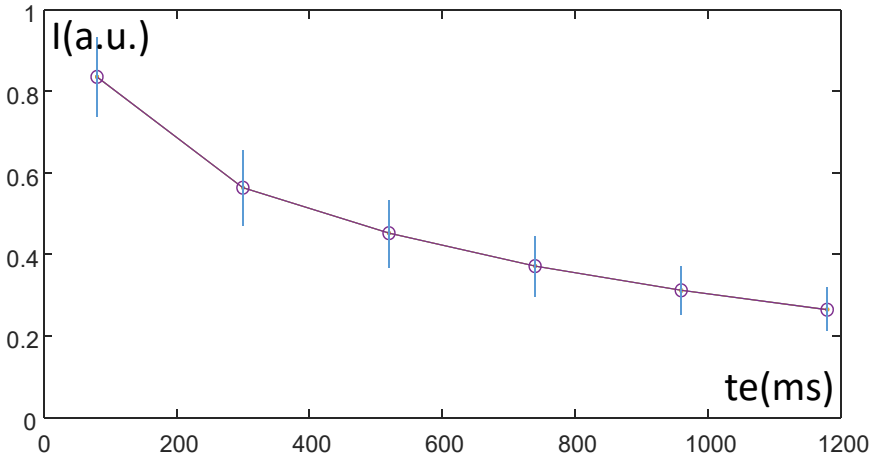
T2-Quantitation with template fitting to a library generated with the EPG (including slice profiles)

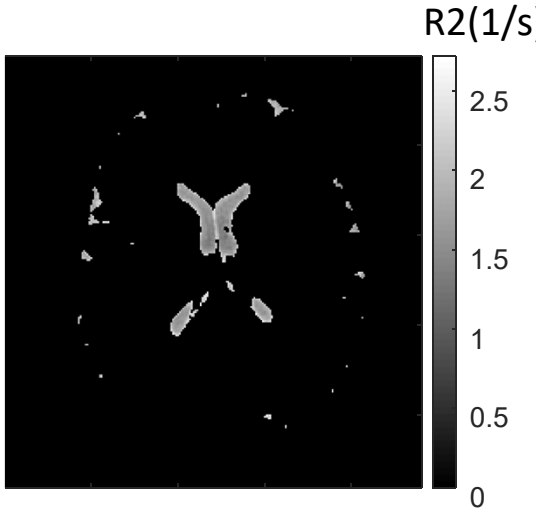
Parametric Imaging with Single Shot spiralTSE: long T2

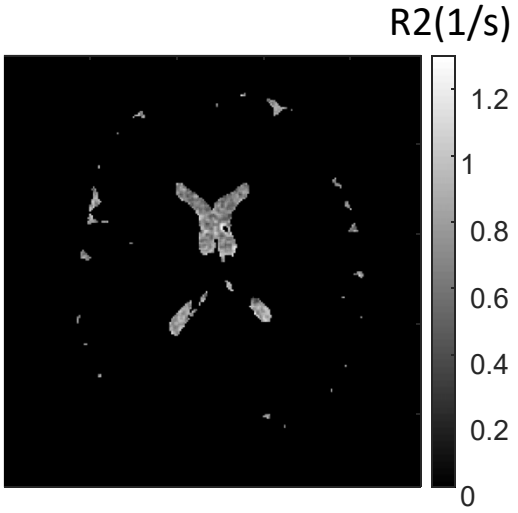
multiple images acquired in one echo train



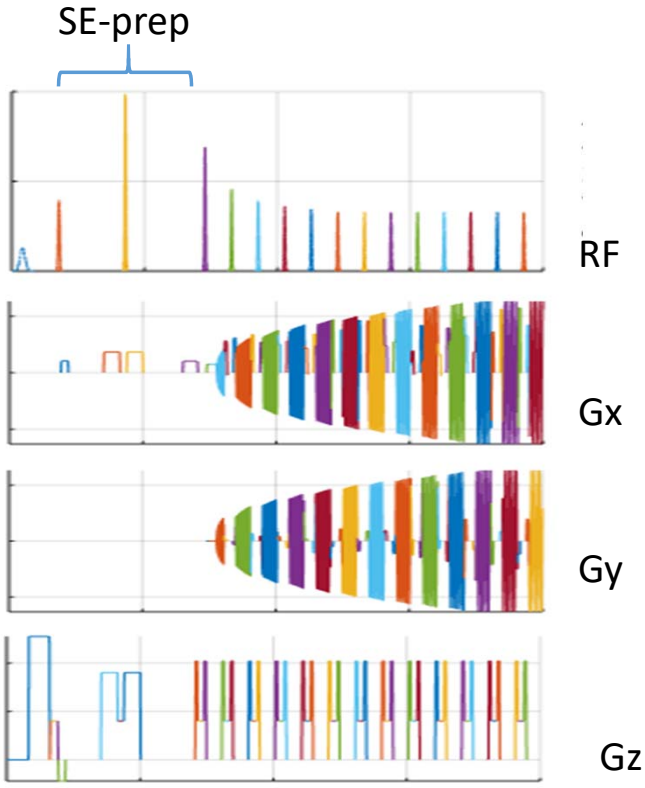


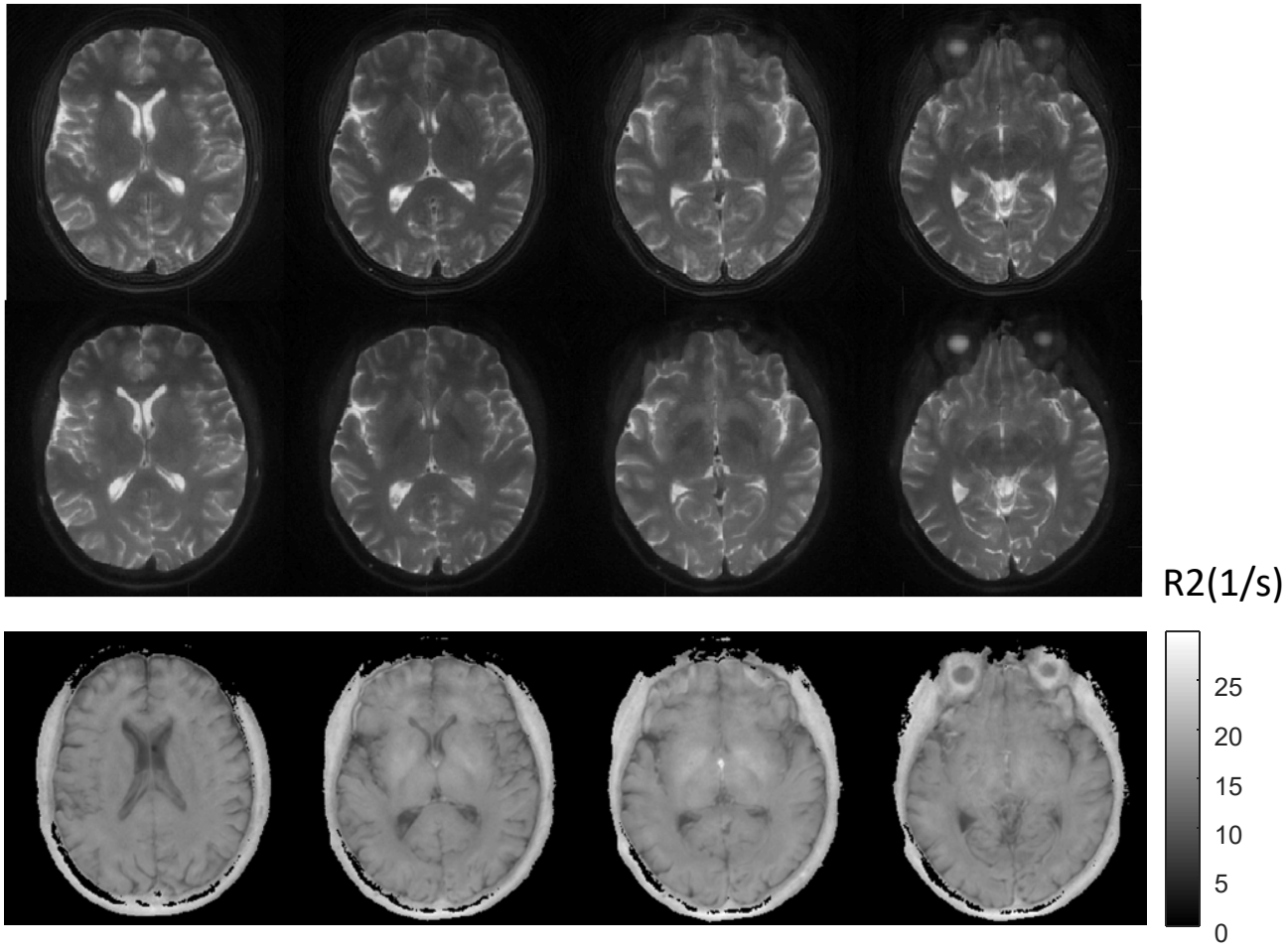






Parametric Imaging with Single Shot spiralTSE: spin echo T2





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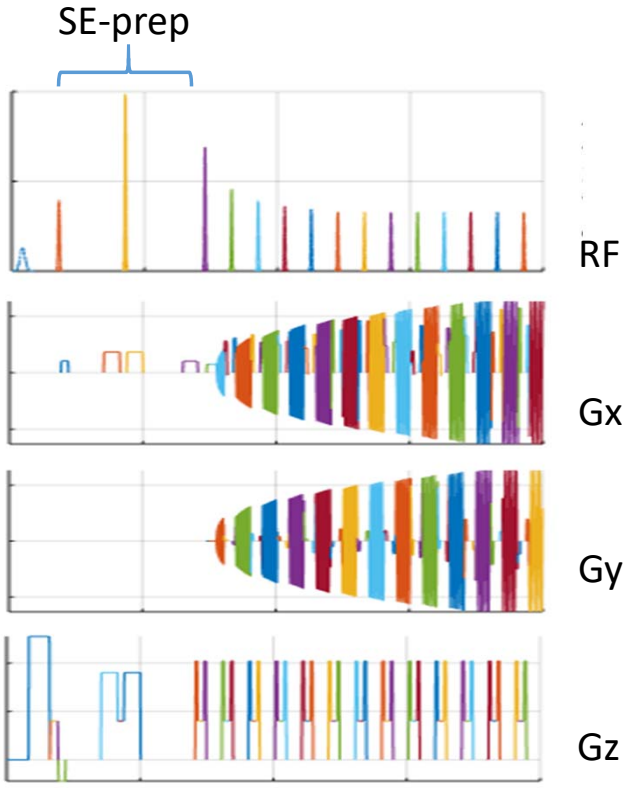
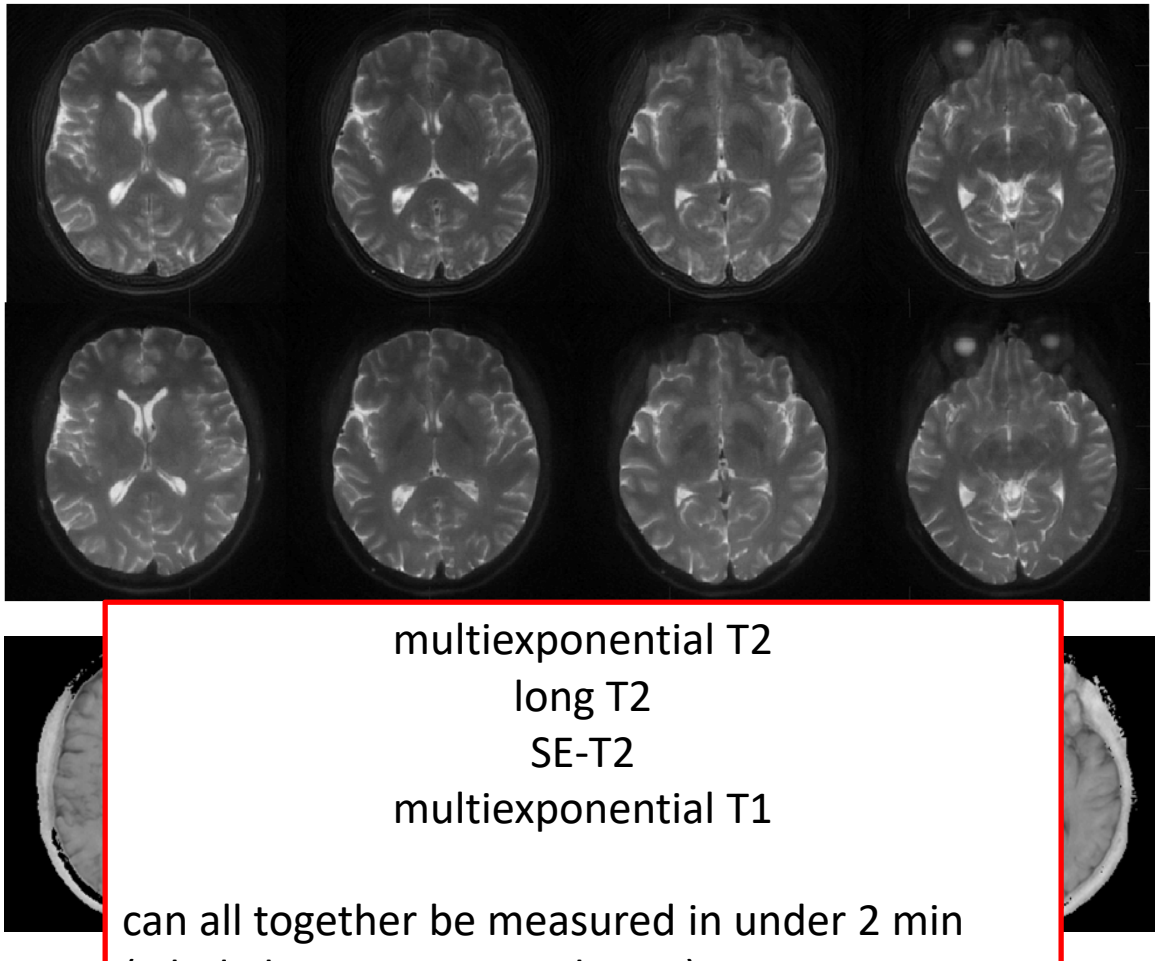
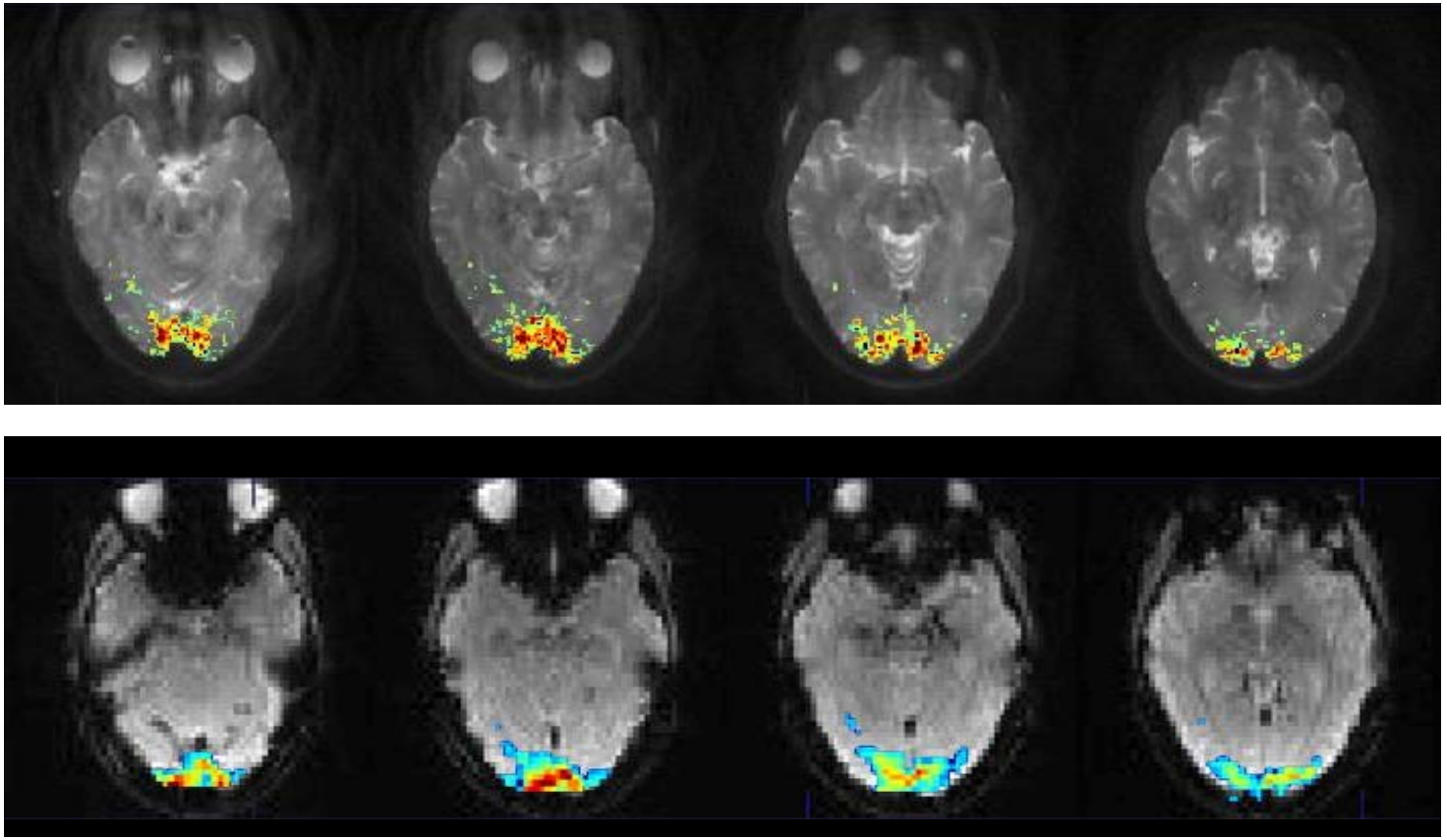




multiexponential T2
long T2
SE-T2
multiexponential T1

can all together be measured in under 2 min
(whole brain, 1mm resolution)

fMRI with Single Shot spiralTSE



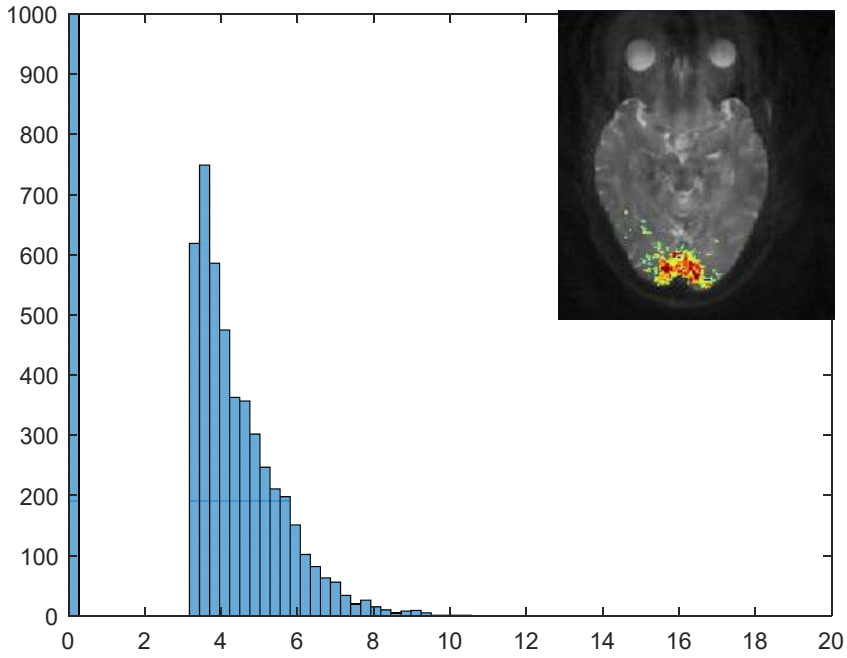
spiralTSE

EPI

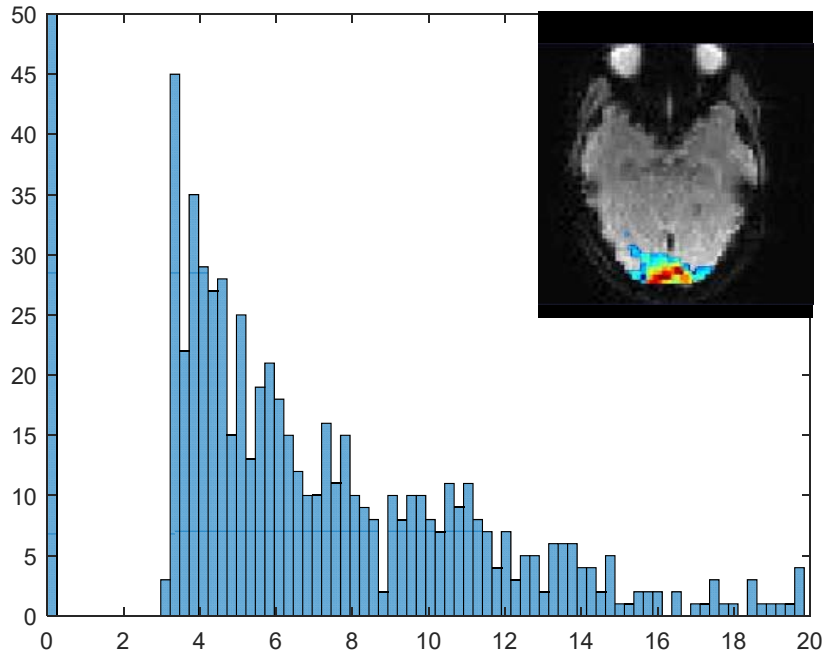
Poser BA, Norris DG (2007) Fast spin echo sequences for BOLD functional MRI. Magn Reson Mat Phys Biol Med 20:11–17.

Histogram of t-Values

spiralTSE



EPI



spiralTSE shows a much more narrow distribution of T-values compared to EPI.
-> no ‚BOLD'-blurring by macroscopic susceptibility.

spiralTSE

Todo:

- concomitant gradient correction
- get reconstructed images on scanner
- fMRI studies
- qMRI applications

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Thanks to….

IDEA

Pulseq

Maxim for providing the Pulseq sequence development platform

….and you for your attention