Pulse sequence hands-on

Session: Hands-on primer on Sequences (Design) for Mapping

Educational Track 2: From Hardware to Map

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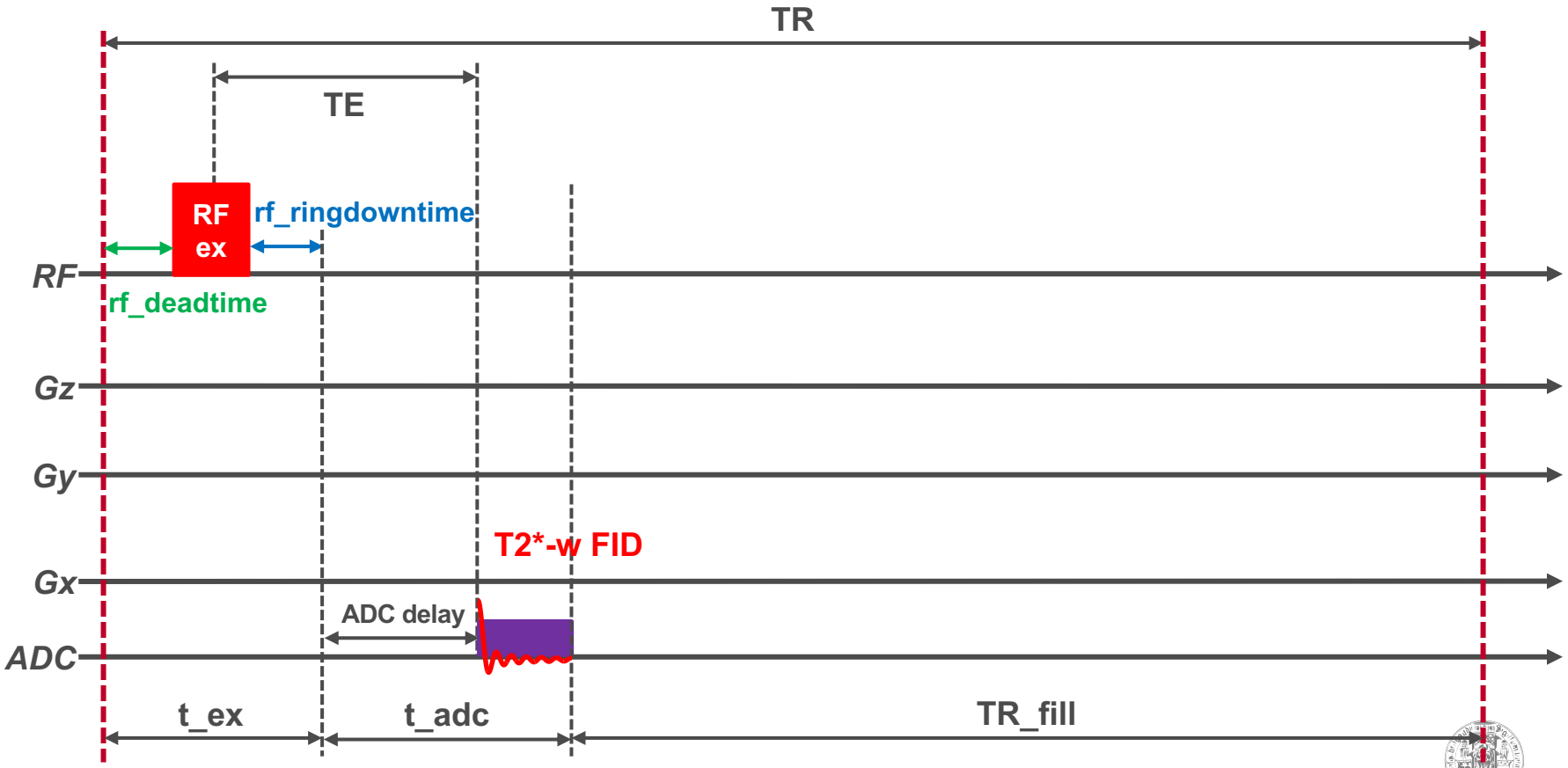
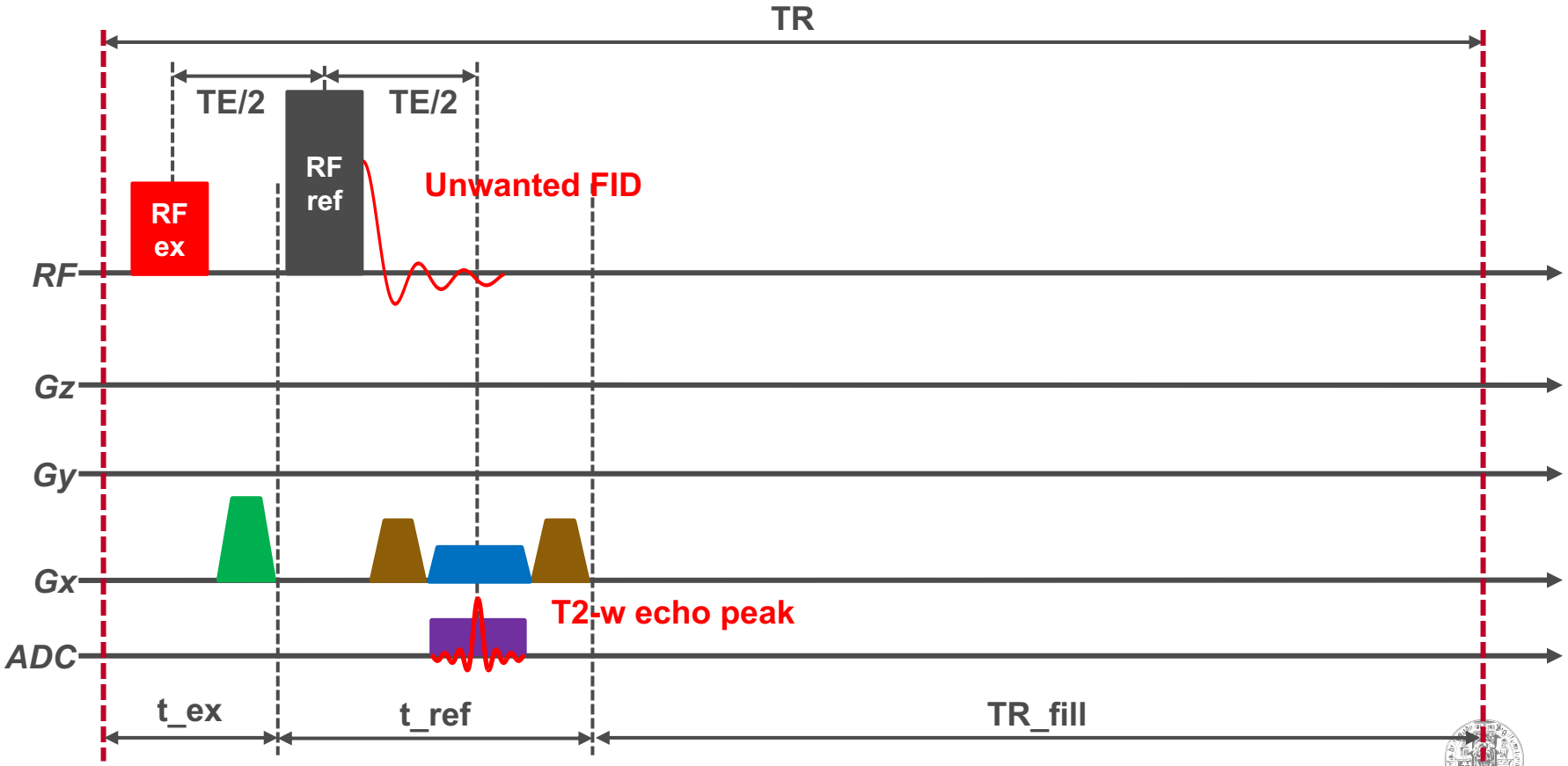
Outline

- Basic MR spectroscopy
  - **s00_fid**: Free induction decay (FID)
  - **s01_from_fid_to_1d_se**: from FID to spin echo (SE) with 1D spatial encoding
- 3D spin-echo sequence
  - **s10_from_1d_se_to_3d_se**: extend 1D SE to 3D SE
  - **s11_optimized_3d_se**: optimize 3D SE with time-optimized gradient
  - **s12_optimized_3d_se_portableScanner**: adapt the optimized 3D SE for the portable scanner
- 3D multi-echo SE for T2 mapping (**Andreia Gaspar**'s lecture)
  - **s20_ optimized_3d_mse_portableScanner** : 3D multi-echo SE with time-optimized gradient adapted for the portable scanner
- Link to sequence source code and related materials:
  https://github.com/mritogether/ESMRMB2024_Hardware_to_Map/tree/main/02_sequence_design_for_mapping

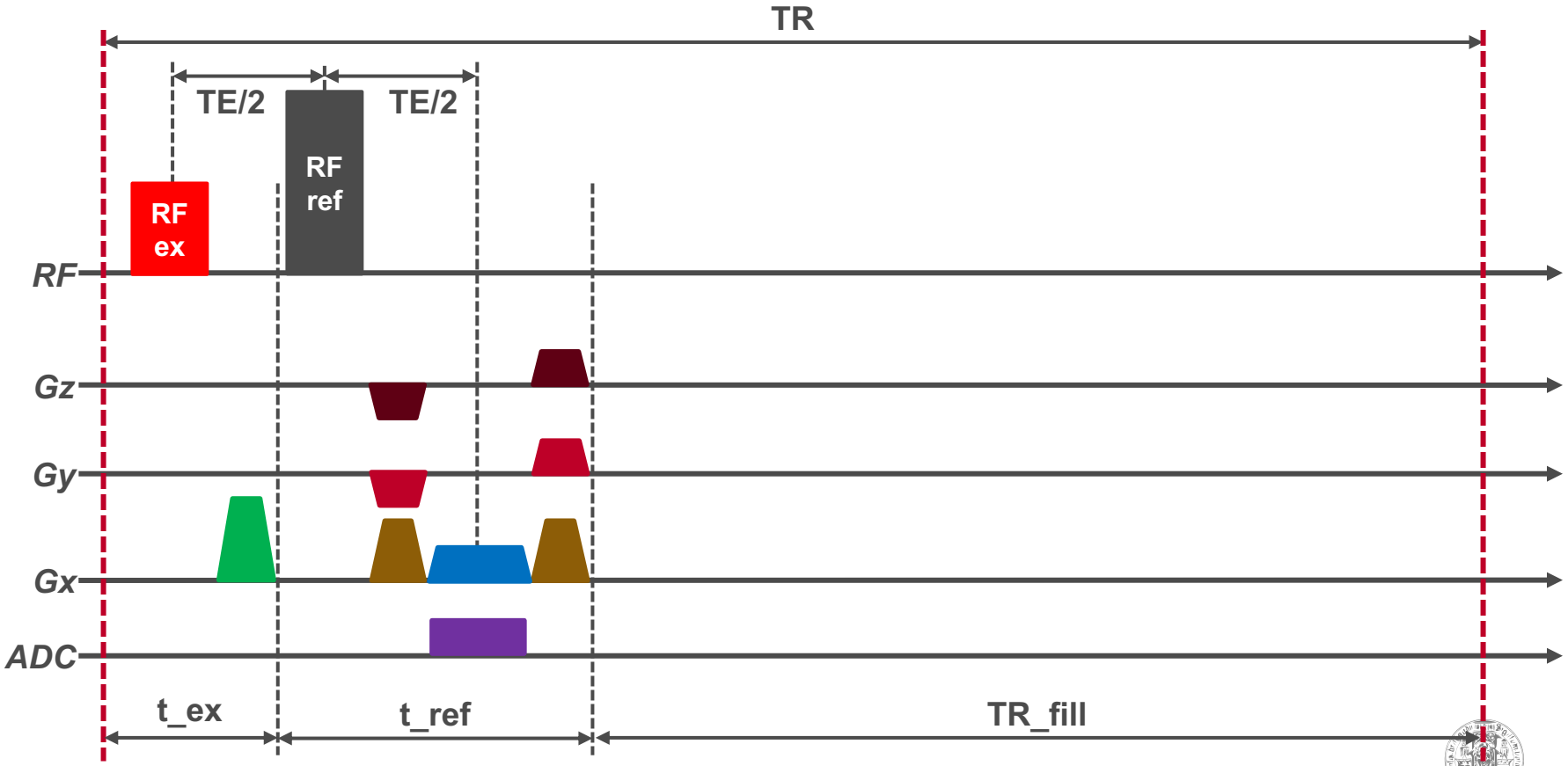
s00_fid



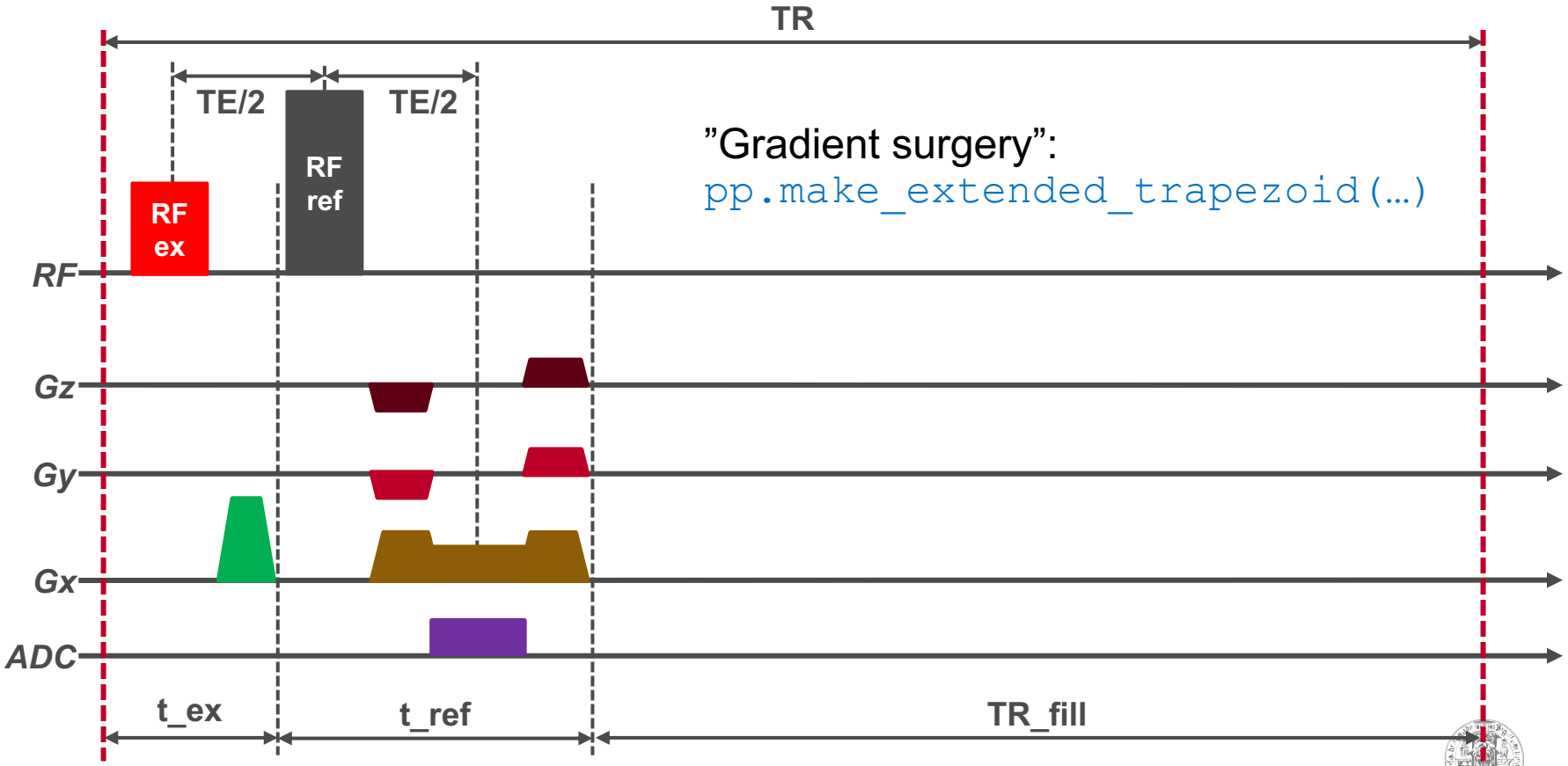
s01_from_fid_to_1d_se



s10_from_1d_se_to_3d_se

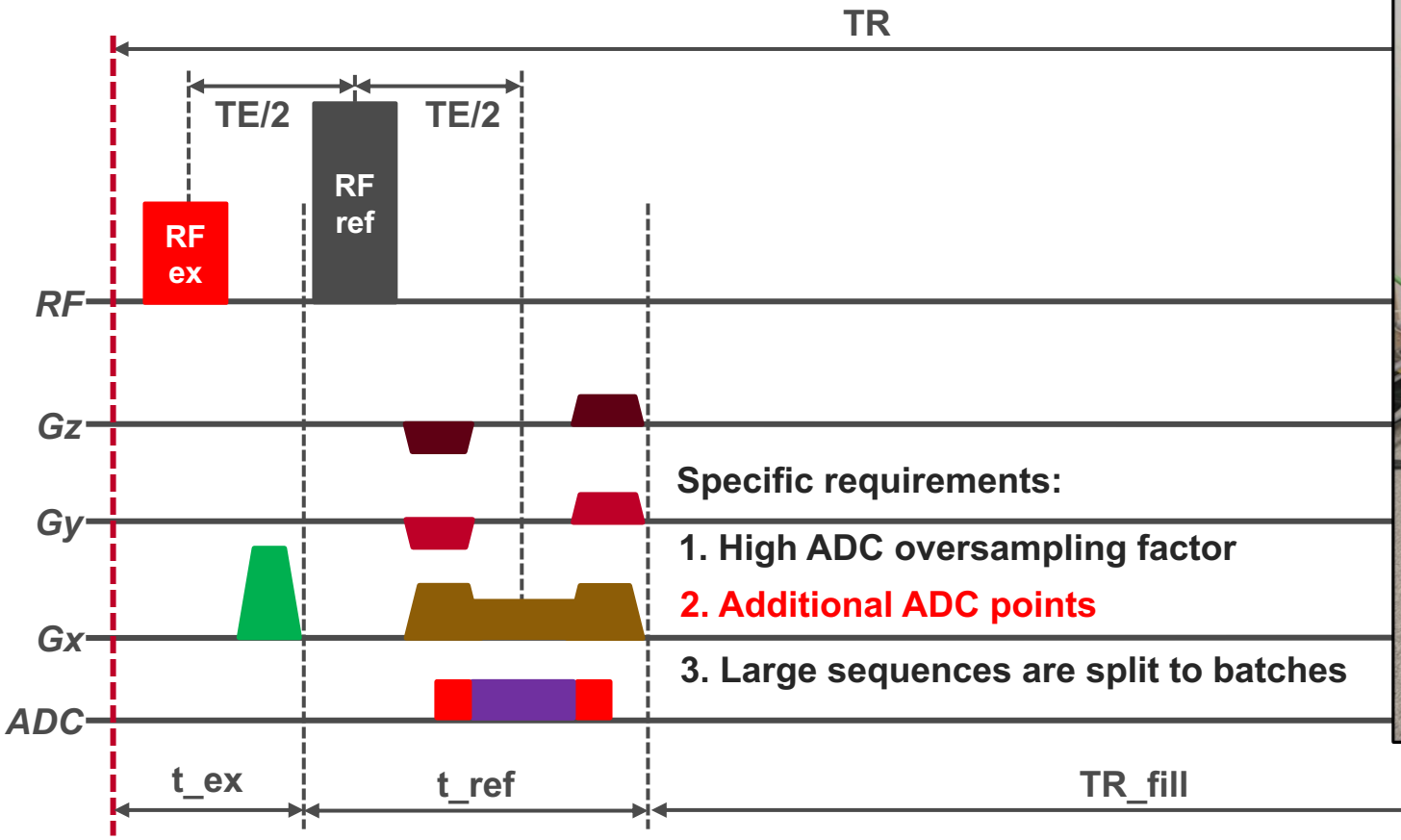


s11_optimized_3d_se



”Gradient surgery”:
`pp.make_extended_trapezoid(…)`

s12_optimized_3d_se_portableScanner



Specific requirements:

1. High ADC oversampling factor
2. Additional ADC points
3. Large sequences are split to batches

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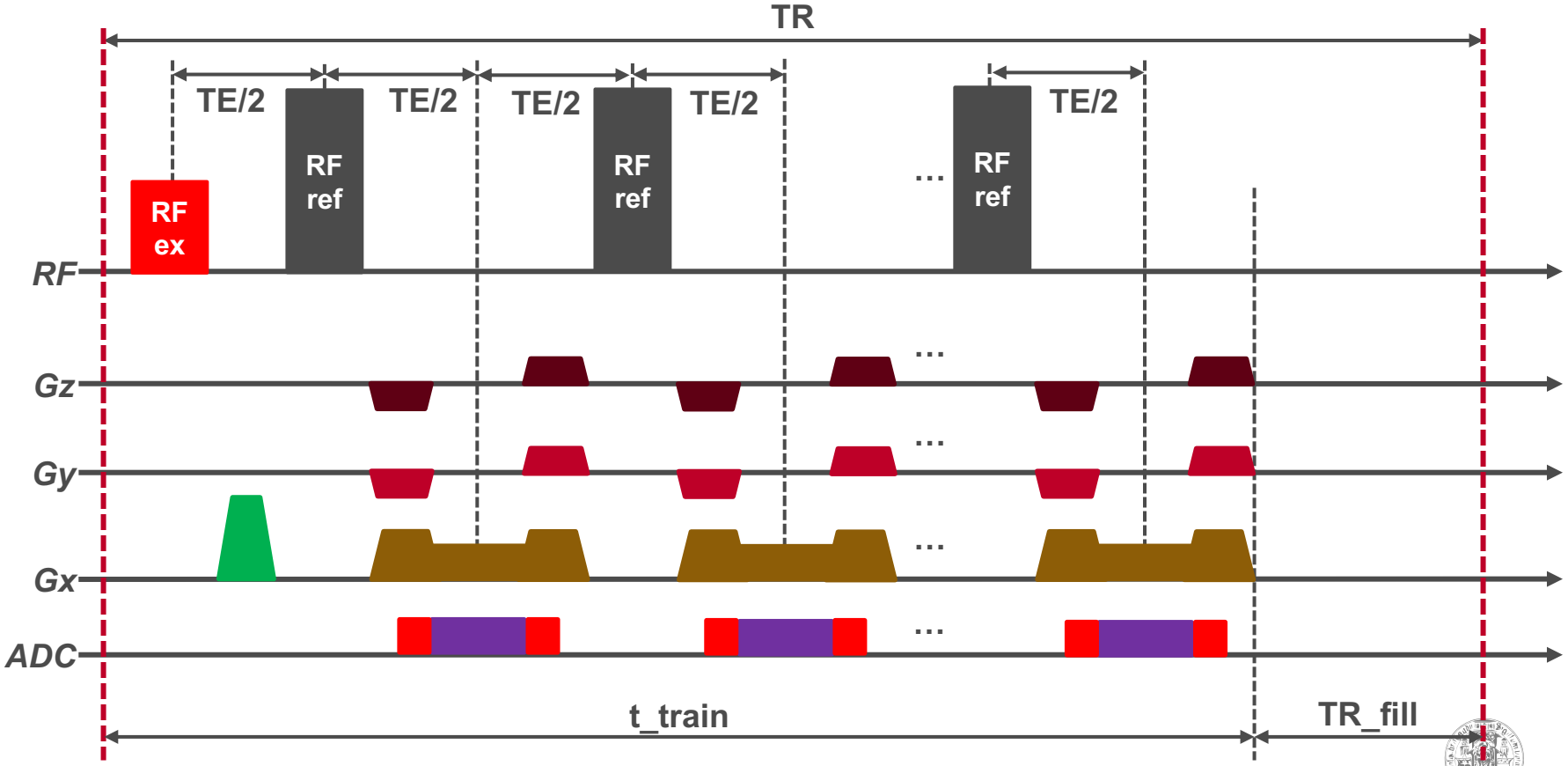
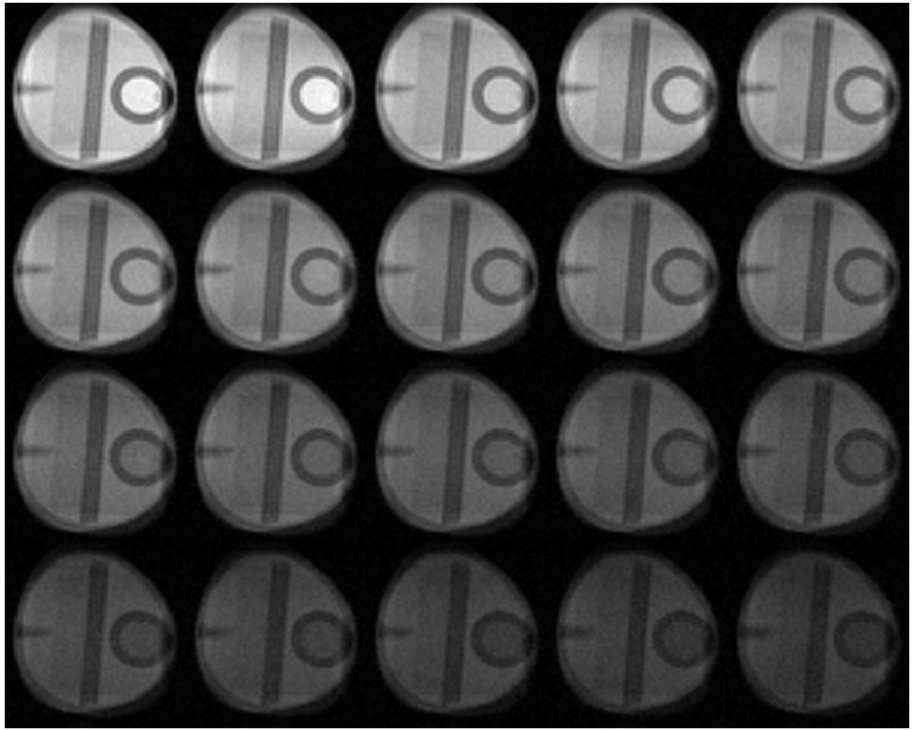
s20_optimized_3d_mse_portableScanner

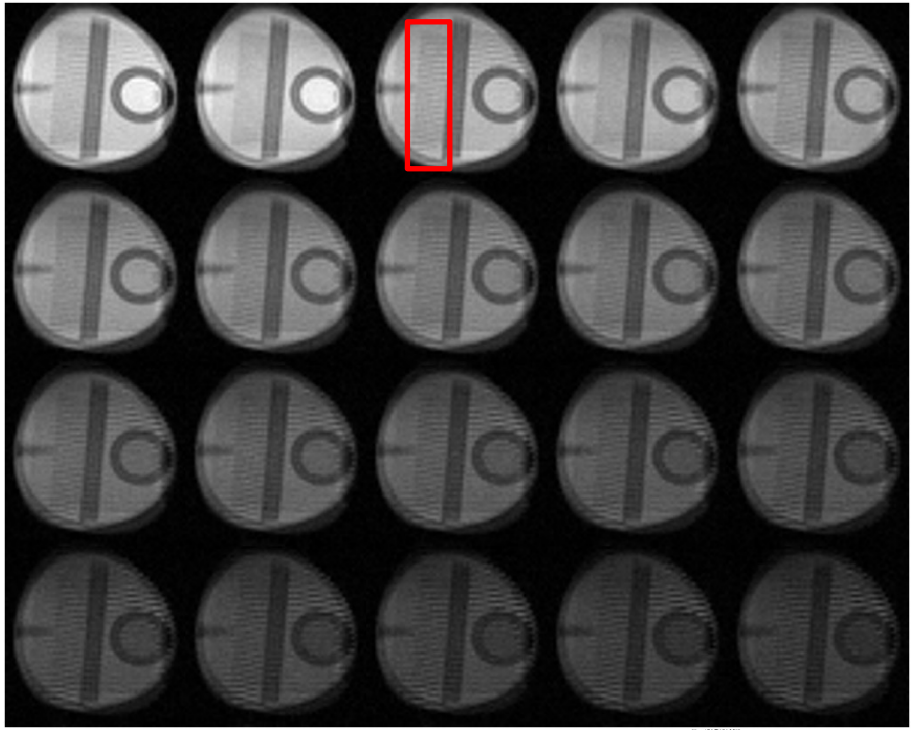


s20_optimized_3d_mse_portableScanner

3D SE images from the portable scanner



All echoes with crushers (the center partition)



All echoes without crushers (the center partition)

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Pulseq MATLAB

pypulseq Python

TOPPE

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