7T DUST upgrade (also called dSYNC) - Installation period start 29 July 2024

Hardware
(no changes in main magnet, gradient system or B0 shim system)
- Digital RF chain
    - better definitions of gradient and RF waveforms (parallel transmit, multiband)
    - no switching of host between 2ch and 8ch transmit
    - double RF power (8 kW) for Classic system
    - quadrupled RF power (to 8 kW) for X-nuclei
    - 32 bits receive resolution (from 16), better dynamic range
- Wireless physiology sensors, manual VCG calibration
- New host and reconstruction computers, GPU for AI reconstructions

Software
- Reconstruction: Recon 2.0: modular design, facilitates user reconstruction on scanner
- Software level R5.9 - NOTE that all functionality available on 3T might not yet be tested for 7T
    - MultiBand SENSE (MB-SENSE), acceleration factor > 2
        - POSSUP reconstruction reduces MB artefacts
    - Compressed SENSE (CS-SENSE)
        - Up to 50% reduced scantime (see figure 1)
    - SmartSpeed
        - AI based sparsity constraint, denoising
    - Diffusion extensions (more directions, ZOOM, IRIS)
    - MRS extensions, including editing
    - EPIC distortion correction for EPI (phase reversal correction) (see figure 2)
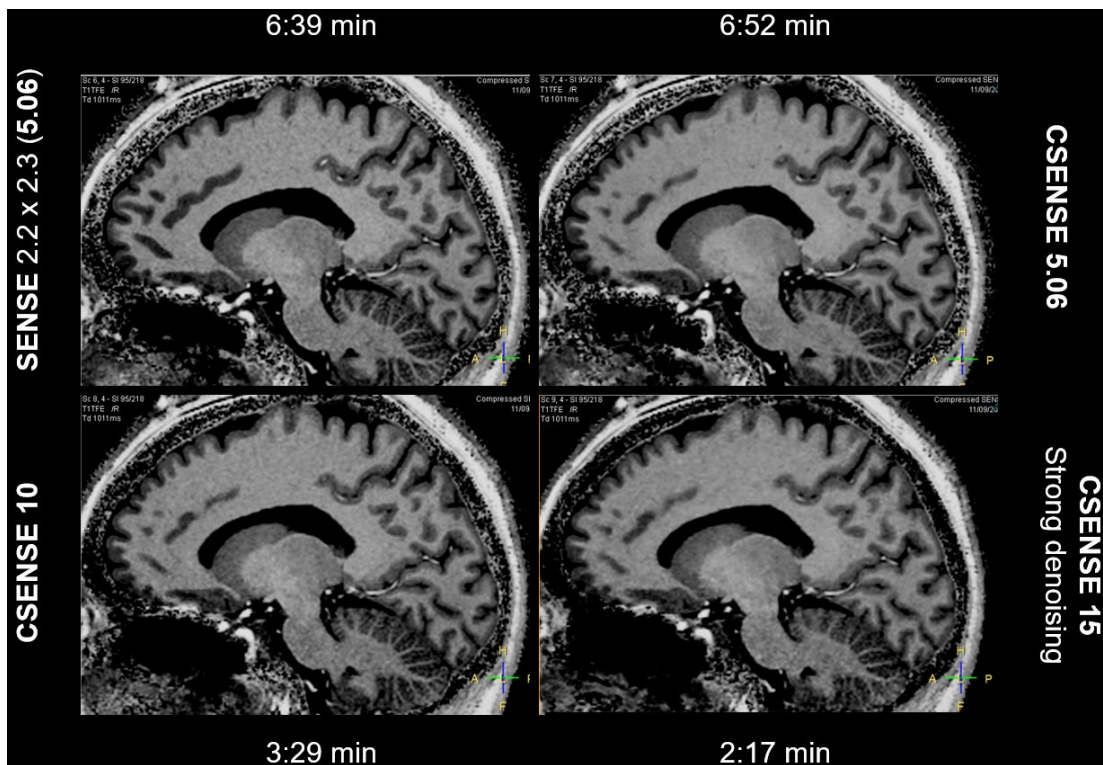   - Improvements in MultiVane (2d, 3D, SENSE compatible)

Figure 1. 3D T1 TFE (MP2RAGE) 0.8 mm isotropic resolution. Upper left: Current protocol, accelerated with SENSE=5.06. Upper right: The same scan time and acceleration with CS-SENSE. Lower left: CS-SENSE acceleration 10, halved scan time. Lower right: CS-SENSE 15, strong denoising, a third of the scan time.