

A summary of SIRF progress since last meeting

- A hierarchy of image data classes introduced incorporating PET and MR images and designed to accommodate prospective image data objects (CT etc.) and data exchange between different images, which ***opens way to synergistic reconstruction***.
- Following a joint brainstorming session with CCPi team at Hackathon meeting, a unified PET/MR/CT/... reconstruction framework is being developed in terms of abstract image and acquisition data objects, acquisition models and objective functions to ***facilitate the use of existing optimization algorithms for reconstruction and the design of new ones***.
- Elementwise multiplication and division of SIRF data objects implemented that can be used in Python scripts as * and / and in MATLAB as .* and ./, ***making SIRF scripts easier to understand by Python/MATLAB users***.
- Subset option for PET forward and backprojection implemented, ***facilitating users' development of their own reconstruction algorithms of Ordered Subsets type***.
- Addition of Parallel Level Sets ***anatomical prior*** for PET
- Various small changes/bug fixes.

Edo Pasca (STFC)

- CCPI/CCPPETMR integration
 - Added to Python classes in SIRF to enable use of SIRF object in CIL algorithms (PR 237 and 238)
 - Added CIL framework and regularisers to SuperBuild (PR 154)
- Created a VM with Ubuntu 18.04 and recent Gadgetron/ISMIRMRD (not yet in production)
- Worked at ACE package (conda build)
- Progressed conda build (stuck at Gadgetron now)

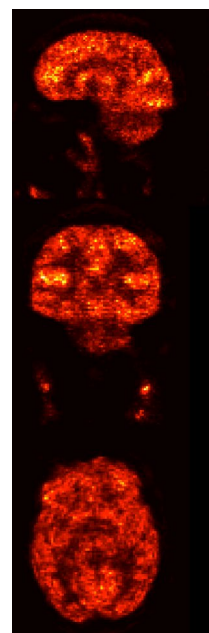
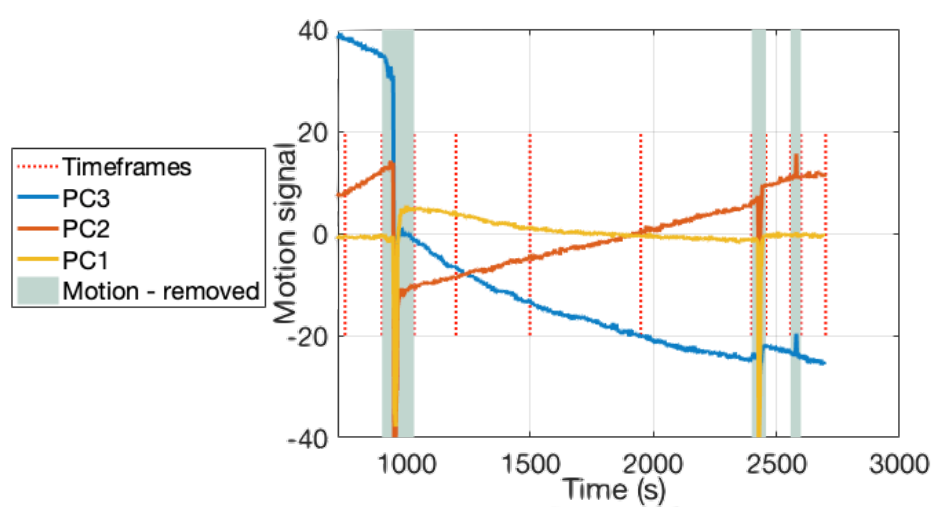
Ben Thomas (UCL)

- SIRF or STIR on Azure
- Re-using CCPETMR_VM
- Azure configuration files and/or Terraform
- Used at PSMR 2018 and MIC 2018 courses

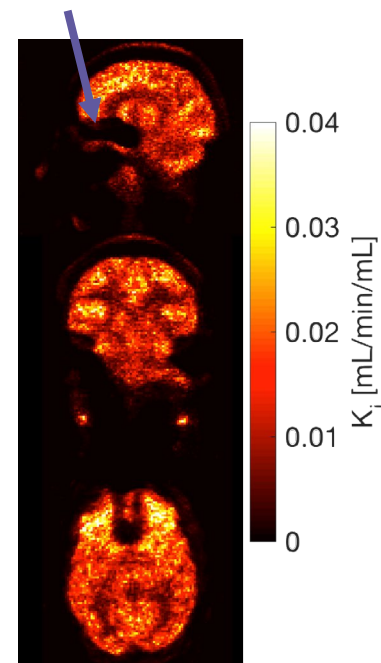
Richard Brown (UCL)

- Continuation of SIRFReg
 - More generic (enables incorporation of other packages)
 - Other small changes
- STIR: Motion-corrected (parametric) reconstruction
 - Poster at MIC 2018 (and presentation at STIR Meeting)
 - How to export functionality to SIRF?

RESULTS 2/2



Underestimation of inferior frontal lobe.



Palak Wadhwa (Leeds)

GE Signa PET/MR PET non-TOF data

Done:

- Listmode
- Sinograms
- Singles and hence randoms
- Normalisation (crystal efficiencies, geometry, wcc calibration)
- Rotation
- Scatter

To do:

- Vqc (gantry alignment)
- Dead-time
- Block geometry (WIP by Parisa Khateri, Zurich)

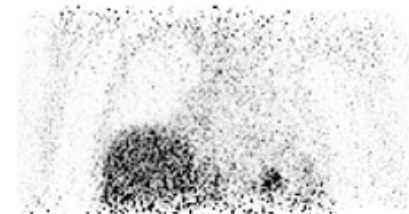
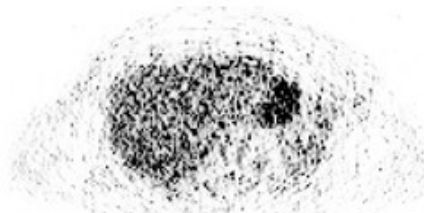
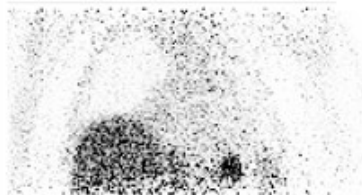
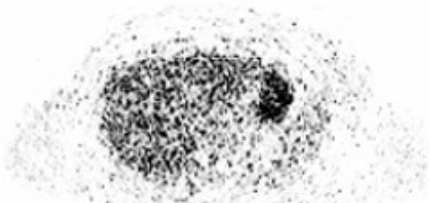
IMAGE RECONSTRUCTIONS: OSEM, 28 SUBS over 3 ITERS

STIR

GE-TOOLBOX



HOFFMANN



PATIENT

TRANSVERSE

CORONAL

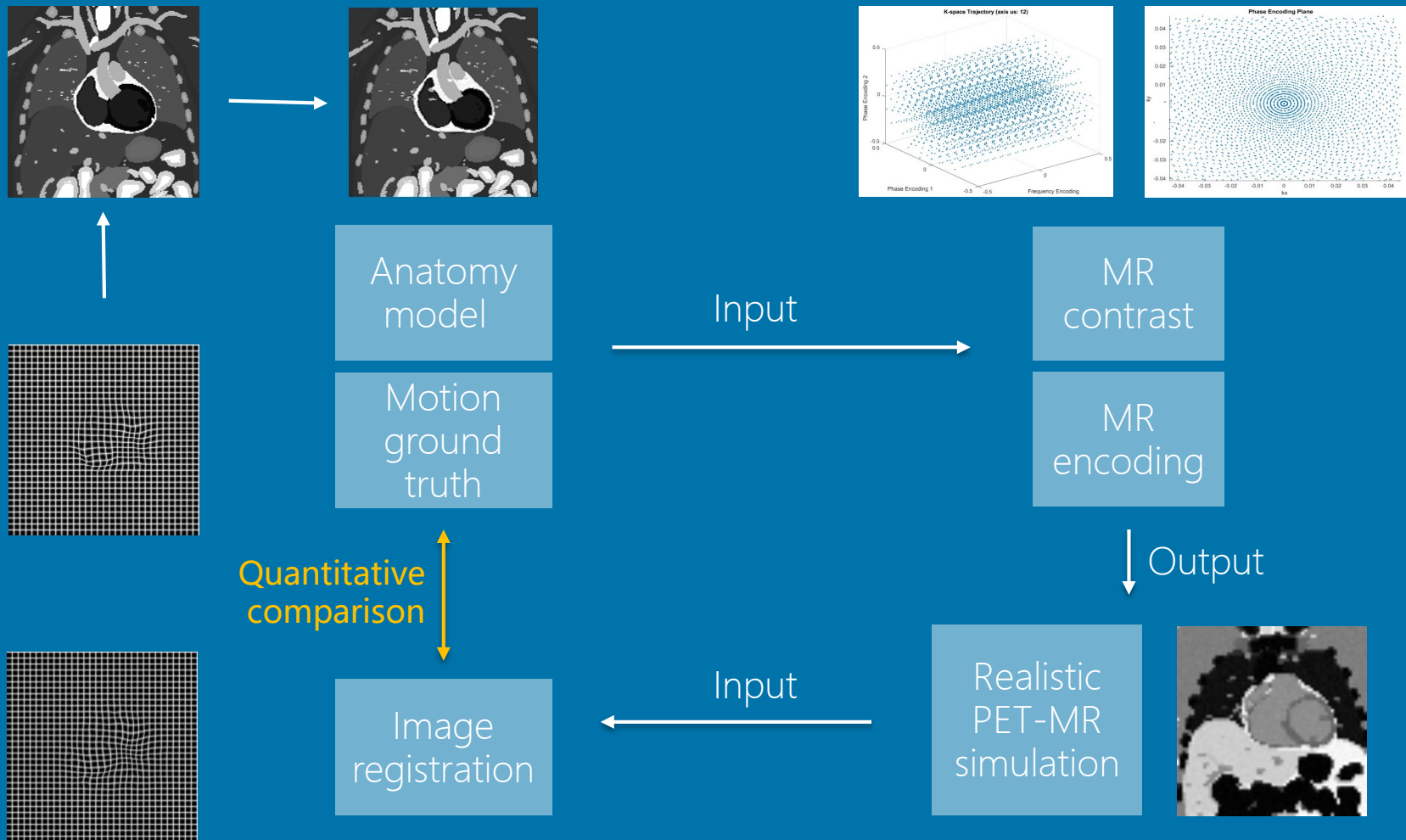
TRANSVERSE

CORONAL

Johannes Mayer (PTB)

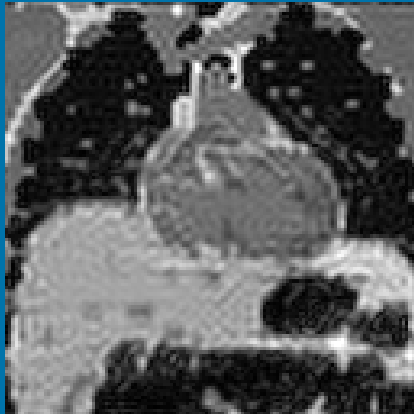
- Simulation framework for dynamic data with cardiac and respiratory motion for PET/MR
- In progress (on public branch)
- Presented at previous Developer Meeting
- Submitted to ISMRMR

Numerical Simulation Framework



Some Examples

Again: these are recons of ISMRMRD rawdata files, *not* the simulation!



- Low-res 3D cartesian acquisition.
- 10 dynamics acquired.
- Flash contrast.
- Continuous contrast inflow during acquisition.
- Respiratory motion.



- 3D radial trajectory
- Flash contrast (no change)
- Simulation of cardiac and respiratory motion in sync.
- Retrospectively binned in 6 respiratory phases using self-navigator surrogate signal.

STIR coming soon

- TOF (Nikos Efthimiou et al.)
 - Branch clean-up in progress
 - PMB paper revised version submitted
- Multi-bed position and LPS coordinates (Ashley Gillman et al.)
 - PRs in progress
- HKEM (Daniel Deidda et al.)
 - PR in progress
- Block detectors (Parisa Khateri et al.)