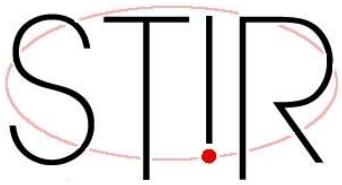


STIR

Software for Tomographic Image Reconstruction

http://stir.sourceforge.net

Kris Thielemans
Charalampos Tsoumpas
Nikos Efthimiou

ASC

UCL

STIR 4.1 new features

- **Support for GE RDF9**
  - Validated for the GE Signa PET/MR by *Palak Wadhwa* (Leeds) Extended to PET/CT systems by *Ander Biguri* (UCL)
  - We currently read listmode, sinograms and calibration files. This code is TOF-ready, but pending merge of the TOF Pull Request.
  - **Warning**: currently images will be reconstructed flipped with respect to the standard STIR orientation.
- **NiftyPET functionality** *Richard Brown* (UCL)
  - Siemens mMR only (if CUDA installed)
  - Projectors (however, circular artefacts currently under investigation)
  - LmToProjData
  - Norm extraction

STIR

STIR 4.1 new features (cont.)

- **Relative Difference Prior** by *Robert Twyman* (UCL)
- **scatter estimation parsing** now prefers specifying normalisation and attenuation via two separate keywords.
  Exact naming still under discussion, see confusing normalisation keywords · Issue #757 · UCL/STIR (github.com)

Towards STIR 5.0 (already merged)

- At least C++11 is now required
- **Maximum Likelihood estimation of normalisation factors** in 3D now includes estimation of geometric factors.
  "Virtual crystals" to be enabled soon.
  Tahereh Nikjenad (Lisboa and PETsys).
- ROOT files produced by GATE can now be interpreted using "virtual crystals"
- **Logcosh Prior**, *Robert Twyman* (UCL)
- Many operations with ProjDataInMemory are faster, *Richard Brown* (UCL)

Towards STIR 5.0 (in progress)

- Block geometry
  Parisa Khateri et al.
- View offset support
  Palak Wadhwa et al.
- Multiple bed position support
  Ashley Gillman et al.
- Normalisation with calibration etc
  Daniel Deidda et al.
- Spatially variant penalty strength (kappa)
  Robert Twyman et al.
- White-space convention enforcement

STIR

Towards STIR 5.1 (in progress)

- Alternative MCIR implementation (using adjoint warping as opposed to inverse)
  Richard Brown and Kris Thielemans
- Axial effects in ECAT8 normalisation
  Kris Thielemans

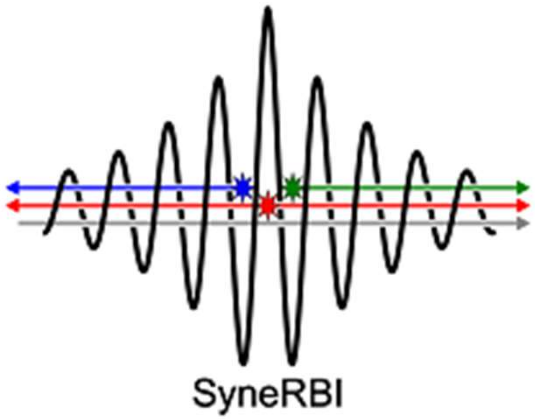
Towards STIR 6.0 (in progress)

- TOF
  Nikos Efthimiou, Elise Emond et al.
- Multiple energy window support for PET
  Ludovica Brusaferri et al.
  - Data structures
  - Scatter simulation
  - gradients of projector and scatter estimator w.r.t. emission and attenuation image

  => MLAA using energy information

STIR

CCP in Synergistic Reconstruction for Biomedical Imaging



- **5 year** funding (April 2020 – March 2025)
- Budget for networking activities
- Core support
  - Scientific programmers: **1.8 FTE** (for 5 years)

STIR

Architecture overview

POSSUM

Standard file format for (almost) 'raw' data (PET and MR)

Framework

PET package 1

PET package 2

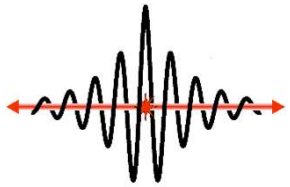
Optimisation Code 1

MR package 1

MR package 2

Images (DICOM, Nifti,…)

File format translators supplied by/developed with manufacturers



Software location

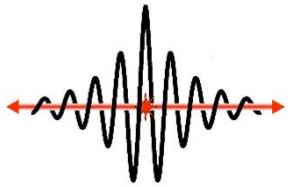
https://github.com/SyneRBI/

– SIRF
  - STIR
  - Gadgetron
  - NiftyReg

– SIRF-SuperBuild
  - SIRF (and hence STIR, Gadgetron, NiftyReg, ITK…)
  - CCPi-Framework CIL
  - pet-rd-tools
  - siemens-to-ismrmrd
  - …

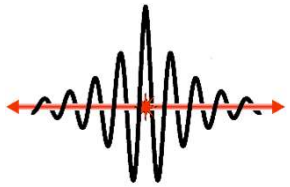
Contributing to STIR, SIRF …

- Ask questions
- Answer questions
- Test new (and old) functionality
- File bug reports
- Add use cases to wiki
- Participate in discussions on code, design etc
- Solve some small “issue”
- Join in a (virtual) hackathon
- Contribute a feature

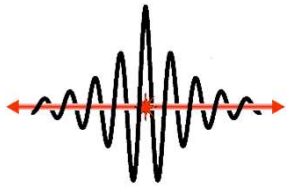


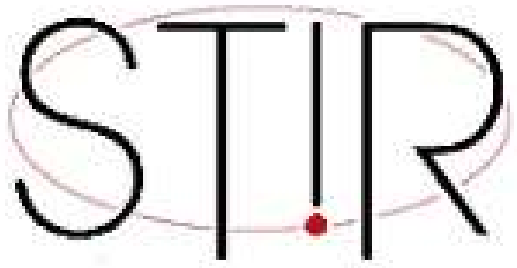
Why contribute to STIR?

- Join a friendly community
- Advance STIR and therefore science
- Feel good about yourself
- Get credit for your work and advance your CV
- Get citations for your contributions
- Get funding for travel and exchanges
- Get one of the yearly SyneRBI awards (£400, £200, £100)



Small github demo





Main publication:

Thielemans, Tsoumpas, *et al* (2012) STIR: Software for Tomographic Image Reconstruction Release 2, *Physics in Medicine and Biology*, 57(4):867-83.

But please cite relevant papers on STIR features that you use.

From STIR 4.1, we will have a DOI with all authors to STIR (via github/zenodo)

Thanks

- File formats
  - GE Healthcare
  - Siemens Healthineers