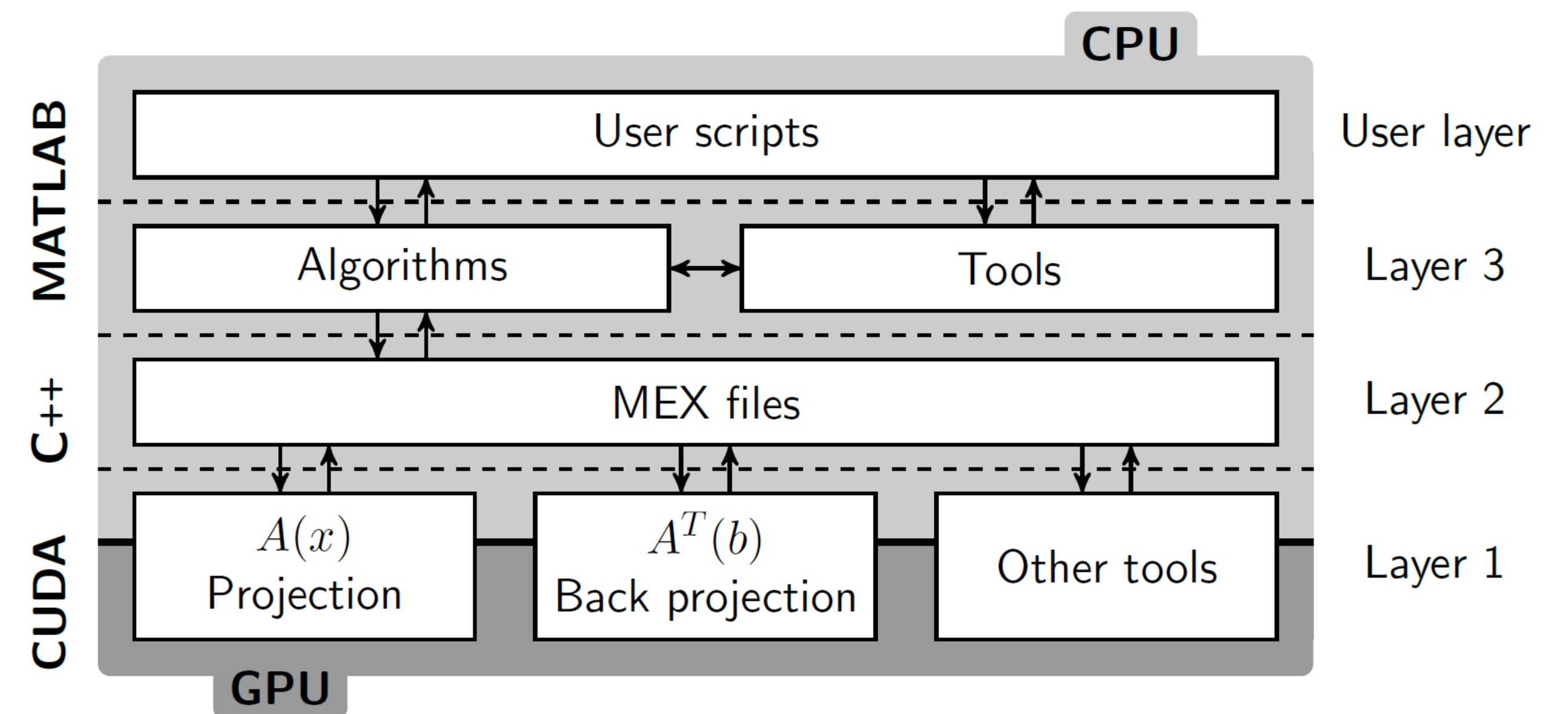


- ∞ MATLAB-CUDA 3D CT reconstruction toolbox
- ∞ Fast, modular, easy to use
- ∞ Free, open source (BSD License)
- ∞ **Iterative algorithms**



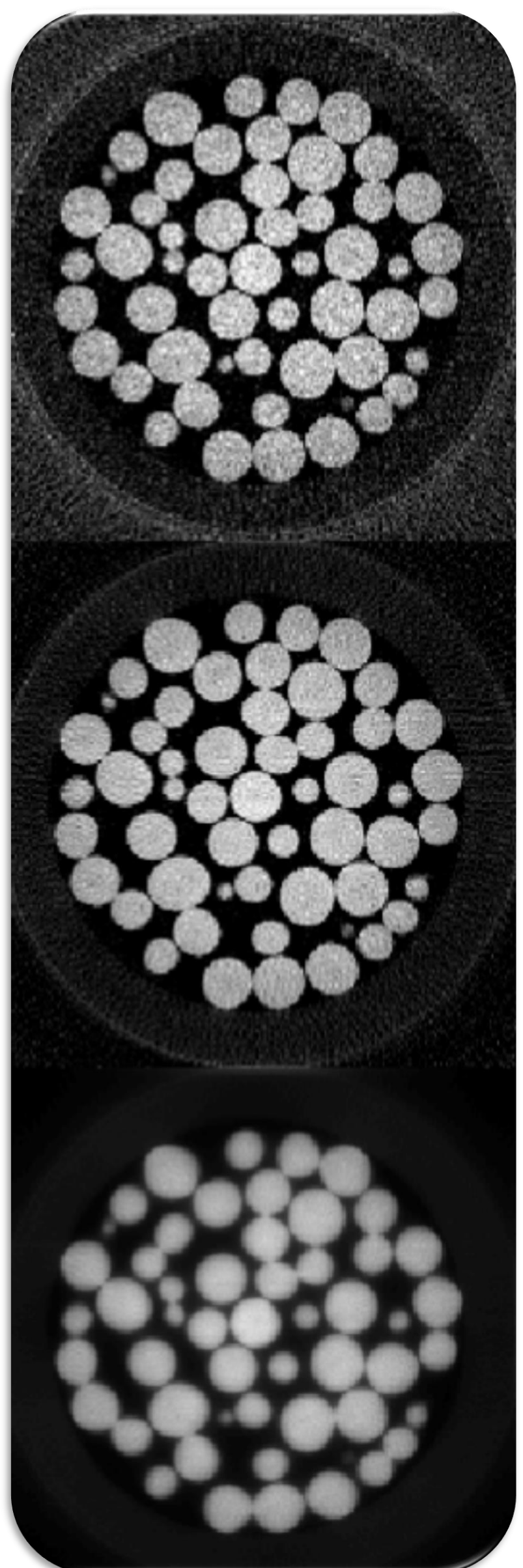
ALGORITHMS

$$\arg \min_x \|Ax - b\|_2^2 + J(x)$$

- ∞ 11 different algorithms
- ∞ Computationally expensive parts → GPU

Why iterative algorithms?

- ∞ Better against noise
- ∞ Better with low projections
- ∞ Tuneable



SophiaBeads Datasheet [1][2]

Radon Transform

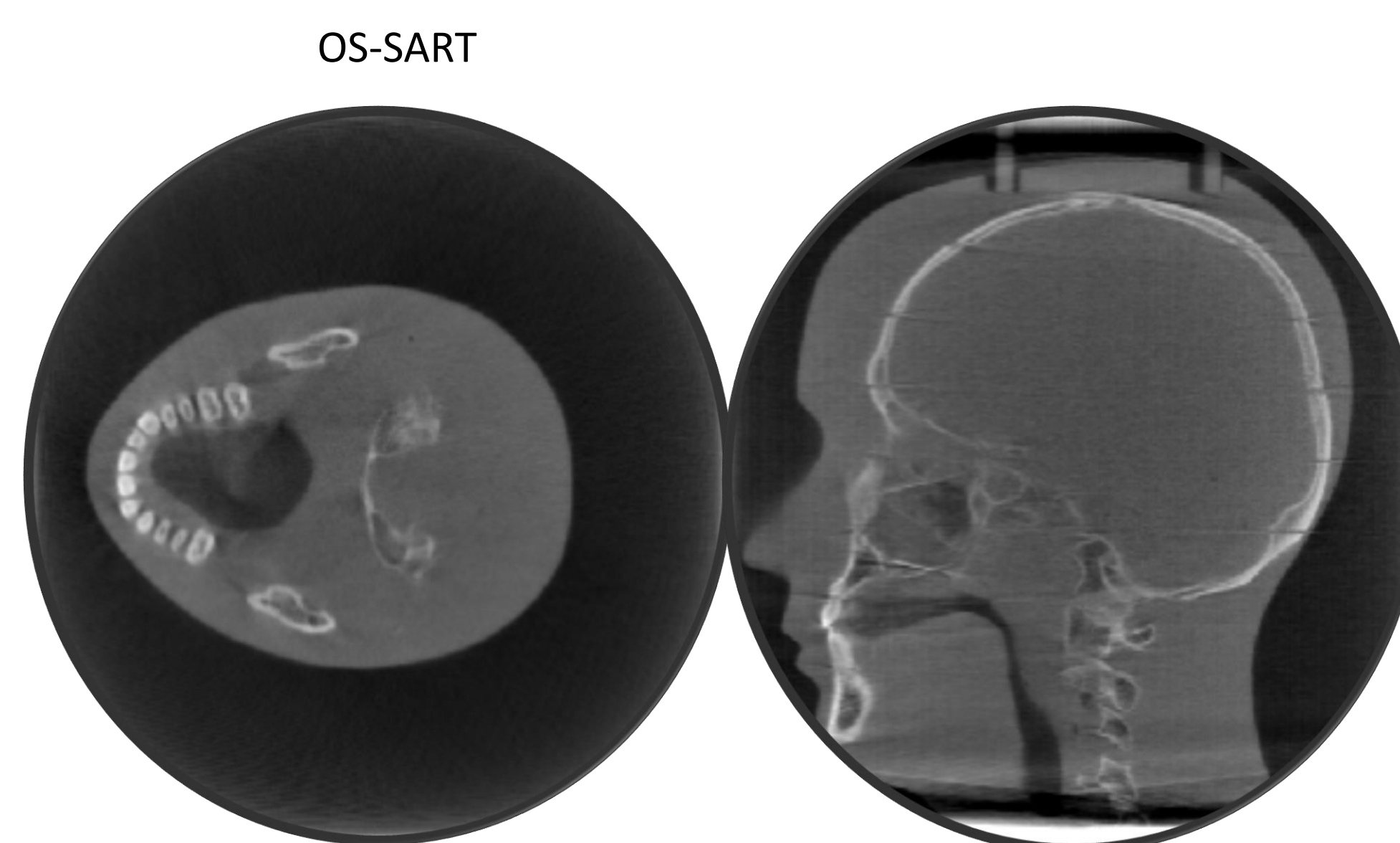
- FDK
- FBP

Krylov Subspace

- CGLS

Statistical Method

- MLEM



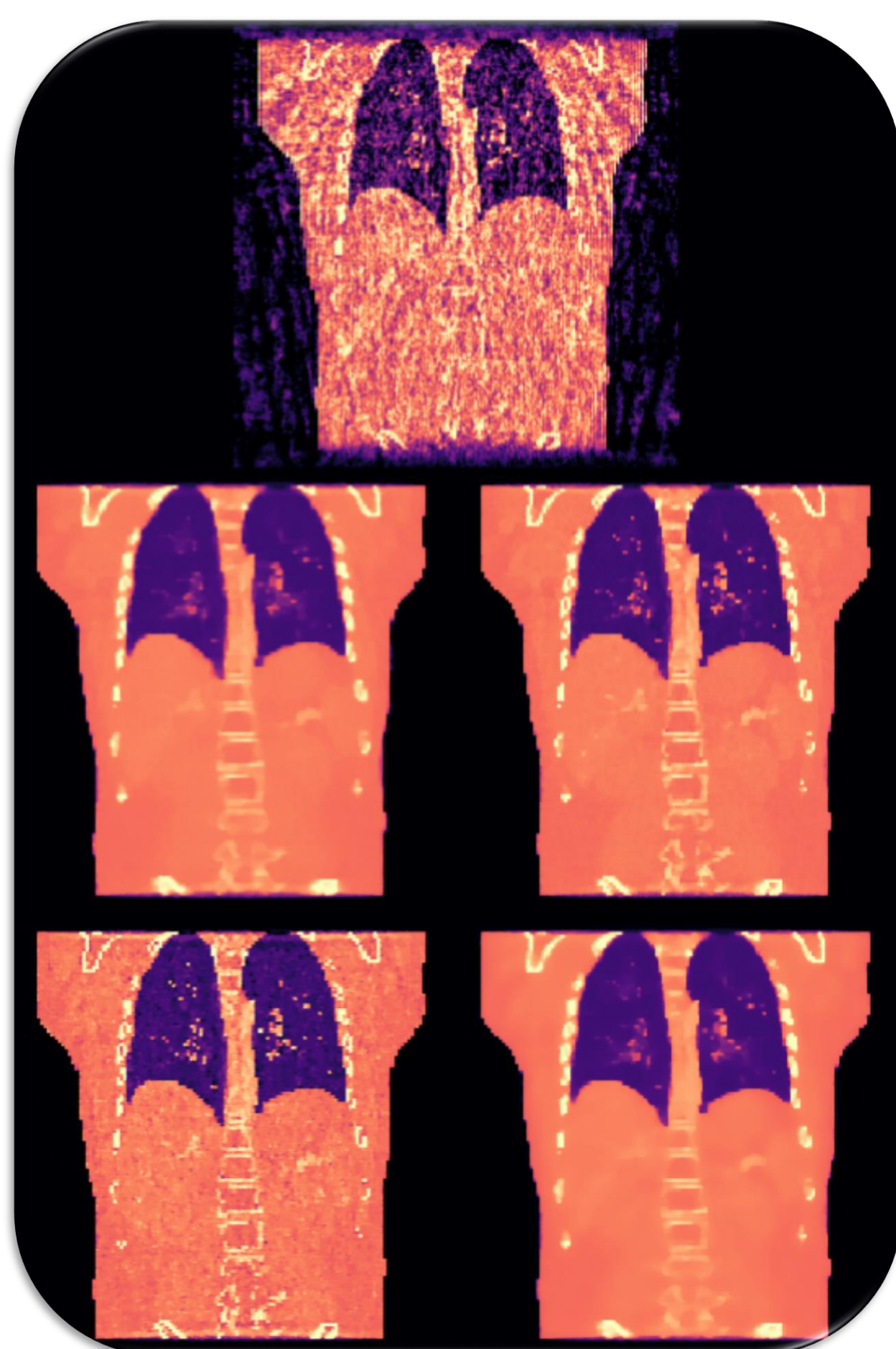
Gradient Descent

- SART
- OS-SART
- SIRT

Total Variation

- SART-TV
- ASD-POCS
- B-ASD-POCS- β
- OSC-TV

Great results using low amount of projections



From top to bottom:
FDK, ASD-POCS, OSC-TV, B-ASD-POCS- β , SART-TV using 20 projections

CONCLUSIONS

- ∞ Choice of algorithm matters!
- ∞ New algorithms will be continually added
- ∞ Contributions accepted
- ∞ Close future work includes 4D algorithms and more TV methods

[Github.com/CERN/TIGRE](https://github.com/CERN/TIGRE)

[1]Coban, S. B. et al. (2015). SophiaBeads Dataset Project. Zenodo. 10.5281/zenodo.16474

[2]Coban, S. B. (2015). SophiaBeads Dataset Project Codes. Zenodo. 10.5281/zenodo.16539

[3] Ander Biguri, Manjit Dosanjh, Steven Hancock, Manuchehr Soleimani (2016)TIGRE: a MATLAB-GPU toolbox for CBCT image reconstruction.