Reconstruction of limited angle data using a fan-beam geometry:

## Iterative vs. Filtered backprojection (FBP) reconstruction
- **Iterative:** Popular for reconstruction from few views, but high computational complexity
- **FBP:** Fast but challenging in case of super-short scans [1]
- **Iterative methods similar to FBP plus non-linear filtering [2,3]**

### Materials and Methods
- Missing projections lead to low- and high-frequency artifacts (Figure 2b)
- Low-frequency artifacts due to missing mass of projection data
- **Compensation Weights (CW) and Regularization**
  - Extend Parker Weights (PW) [4] to account for missing data
  - Compensate missing mass by increasing the weight of acquired rays that are spatially close to the missing data (Figure 1b)
  - Enforce regularization in the reconstructed domain using a non-linear bilateral filter (BF) to remove high-frequency artifacts
- **Experiments**
  - Qualitative and quantitative evaluation using the Shepp-Logan phantom and 5 different reconstruction approaches
    - FBP with PW
    - FBP with CW
    - FBP with PW → BF
    - FBP with CW → BF
    - Iterative with total variation (TV) regularization

### Results and Discussion
- Compensation weights remove low-frequency artifacts (Figure 2bc, Figure 3)
- Bilateral filtering corrects high-frequency artifacts (Figure 2cd)
- Compensation weights with bilateral filtering yields similar results as iterative reconstruction (Figure 2df, Figure 3)

### Conclusions
- We propose novel projection data weights that consider redundant but also missing data
- Reconstruction results are comparable to an iterative algorithm, while being a number of magnitudes faster
- The result can be used as initialization for an iterative method

### References