

3D image reconstruction from Compton camera

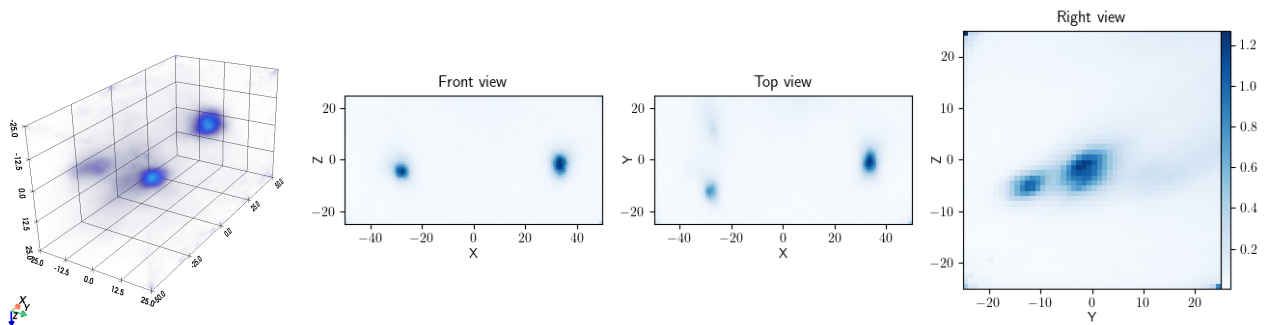
Errata to the master's thesis

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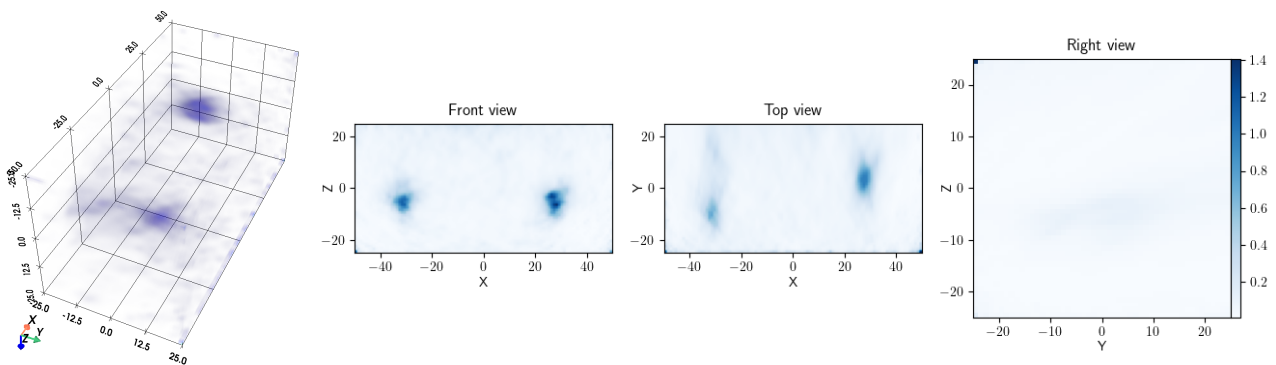
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1 The CMI experiment

The CMI experiment was mistakenly reported to be based on real data. In fact, the reconstruction shown was calculated on simulated data from the VP sim. The true description of the data in subsection 3.4.2. (page 25) should report 24 sensing locations (horizontal range of 70 degrees, vertical range of 15 degrees). The reconstructions in subsection 6.2.2. (pages 60, 61) are therefore incorrect. The corrected version can be seen in Figure 1.



(a) Reconstruction of the insert of the anthropomorphic human phantom.



(b) Reconstruction of the anthropomorphic human phantom, gamma intensity correction was used to improve the visual contrast.

Figure 1: Corrected reconstructions (3D view and projections) of the CMI experiment.

The subsection (page 60) further states that “*All of three capsules can be clearly identified*”. However, this is incorrect - in the phantom, the 33MBq capsule's visibility is limited.

2 MAP-EM

The use of MAP-EM was incorrectly described in section 5.4.1. (page 49). In fact, the total variation minimization step was used only once after the last iteration. The incorrect information also appears in sections 5.5. (page 49), 6.2.1. (page 58), 7.1. (page 68) and 7.2. (page 69). The corrected MAP-EM pseudocode is described in Algorithm 1:

Algorithm 1 MAP-EM

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1: procedure COMPUTEMAP-EM(list of events I, centers of voxels C, detector poses D)
2:   Initialize lambda vector  $\lambda$  using backprojection
3:   Precompute sensitivity vector  $\mathbf{s}$  given the detection geometries
4:   for each iteration  $l$  do
5:      $\lambda^{l+1} = \text{ComputeLM-MLEMStep}(I, C, D, \lambda^l)$ 
6:   end for
7:    $\lambda^{final} = \text{TV-Regularization}(\lambda^{l+1})$ 
   return  $\lambda^{final}$ 
8: end procedure

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3 Input data for the simulation

The input data for all the presented simulated experiments was generated using the VP sim. In sections 6.2.3. (page 62) and 6.2.5. (pages 63 and 65), the source was incorrectly reported as the CoCamSim.

4 Discussion

In section 7.1. (page 67), the sentences: “*The transition from the proposed simulator to a more sophisticated CoCam Sim did not introduce any unexpected phenomena in the reconstruction. This can be accounted to the fact that the impact of neglected phenomena is small.*” should be removed.