

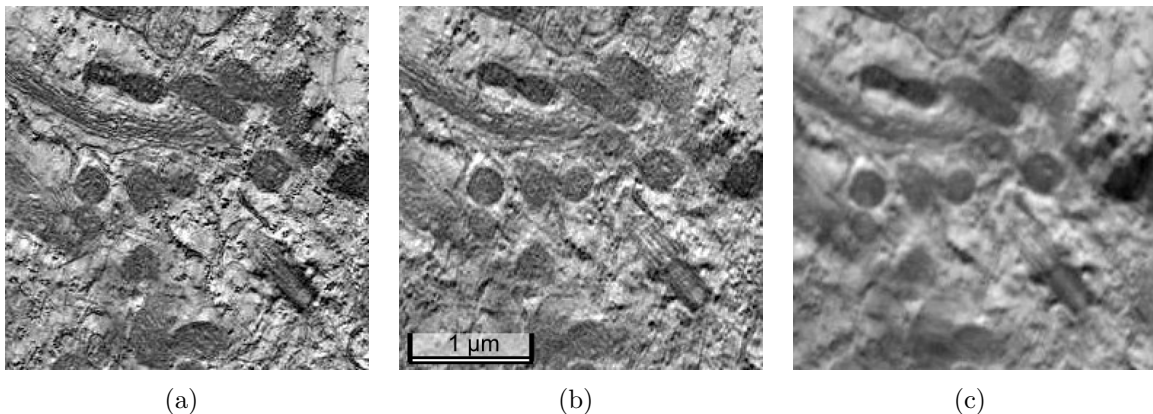
# First Considerations on the Reconstruction of X-ray Tomography

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Soft X-ray microscopy (SAXM) is a new technique that aims to fill the resolution gap between traditional light and electron microscopies, since it is able to visualize specimens larger than the ones used in electron microscopy (EM) at a resolution higher than the one obtained in traditional light microscopy. At present, X-ray data is being processed using software developed for EM (as can be SPIDER[1], XMIPPS [2] or IMOD [3]) and therefore, the X-ray image formation model is ignored. The main purpose of this work is to answer the question: how much 3D reconstructions in X-ray can be improved if the image formation model is explicitly be taken into account.

In order to answer this question several experiments have been made with phantoms. As test specimen, we used a 3D structure of the astrocyte soma, obtained from [4]. In Fig. 1(a) a slice of the original phantom is shown, Fig. 1(b) shows the corresponding slice of the reconstruction from ideal projections (defocus variations have not been considered, that is, we produced the data following the TEM image formation model) filtered to the SAXM cut-off frequency. Finally, Fig. 1(c) represents how the same slice appears using images following the X-ray microscope image formation model. Comparison of Figs. 1(b) and 1(c) -where the fine details of the organelle structure are lost- clearly makes the point of this communication. Fig. 1(c) shows the result that researchers will obtain ignoring the image formation model problem.



**Figure 1:** Corresponding slices of the astrosoma phantom for: (a) reference; (b) reconstruction from ideal data filtered to the X-ray microscope cut-off frequency and (c) reconstruction from X-ray microscope simulated data. Phantom size:  $20.77 \times 15.24 \times 7.77 \mu\text{m}$ .

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