

## Supplementary material

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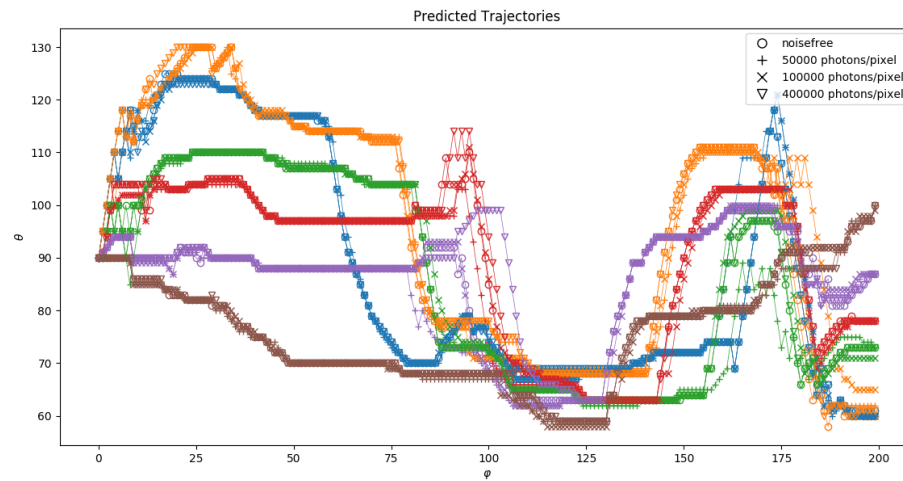
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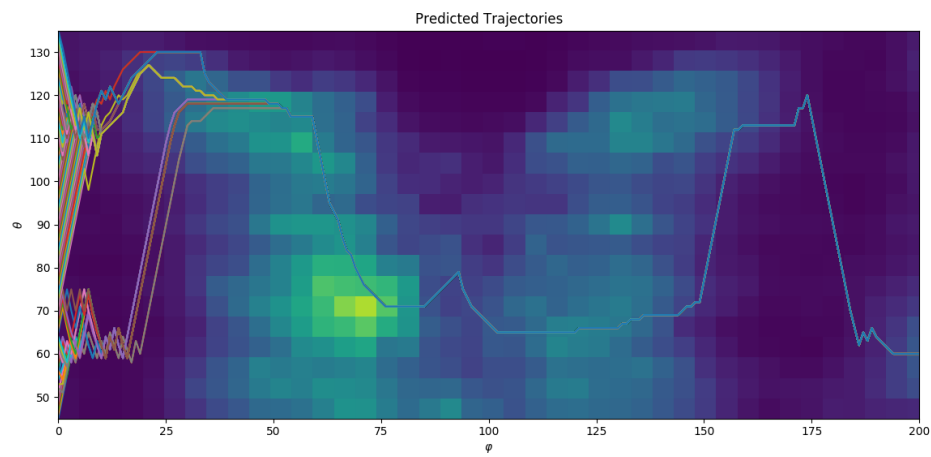
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**Fig. 1** Trajectories predicted for different noise levels of the X-ray projections. All acquisitions are plotted in one color for each screw-pair and start at the same out-of-plane angle of  $90^\circ$ . The different noise levels are indicated by different markers: Circles correspond to the noisefree acquisitions, crosses to  $5 \cdot 10^4$  photons per pixel, x to  $1 \cdot 10^5$  photons per pixel and triangles to  $4 \cdot 10^5$  photons per pixel.



**Fig. 2** Trajectories predicted for all out-of-plane starting angles in the range  $45^\circ \leq \theta \leq 135^\circ$ , with an increment of  $1^\circ$ . The background image corresponds to the groundtruth detectabilities and the plots indicate the chosen trajectories.