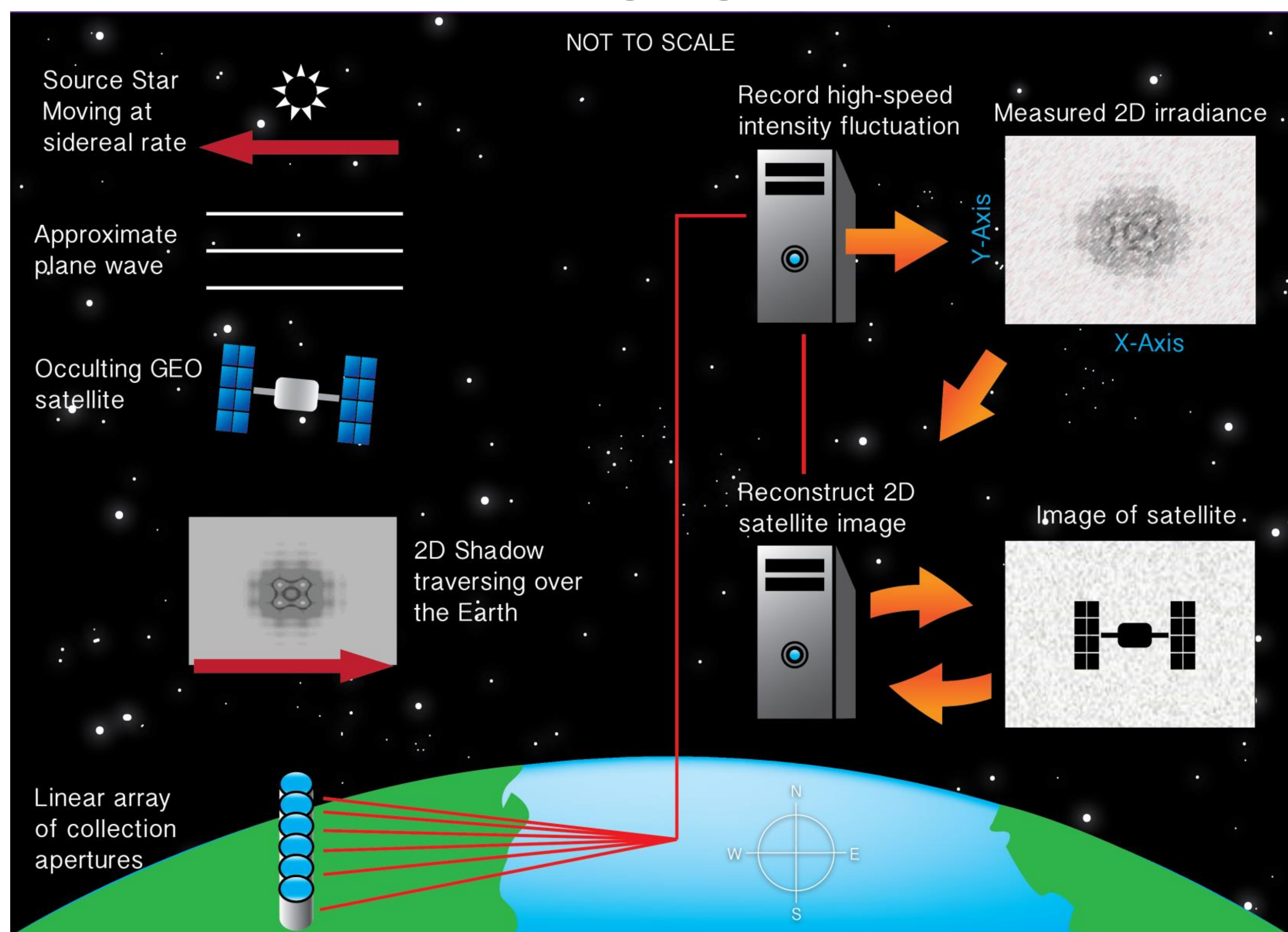




Integrity Applications Inc.
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Shadow Imaging Overview



IAI/PDS Capabilities:

Image Science

Astrodynamics

Astrometry/Photometry

Optical Science/Design

➤ Shadow Imaging

Shadow Imaging's Potential Role in Amon-Hen:

- Silhouettes can be used to significantly improve interferometric imaging:
 - Silhouettes stabilize the image reconstruction problem by a constraint on object support
 - Interferometry literature shows that a constraint on object support is powerful in improving image reconstruction
- G. Le Besnerais, et al., "Advanced Imaging Methods for Long-Baseline Optical Interferometry," IEEE Journal of Selected Topics in Signal Processing, Vol. 2, No. 5, October 2008, 767-80.
- Good constraints on object support are very difficult to obtain for unknown space objects
- Silhouettes can assist the interferometric image collection strategy in a manner analogous to "baseline bootstrapping"

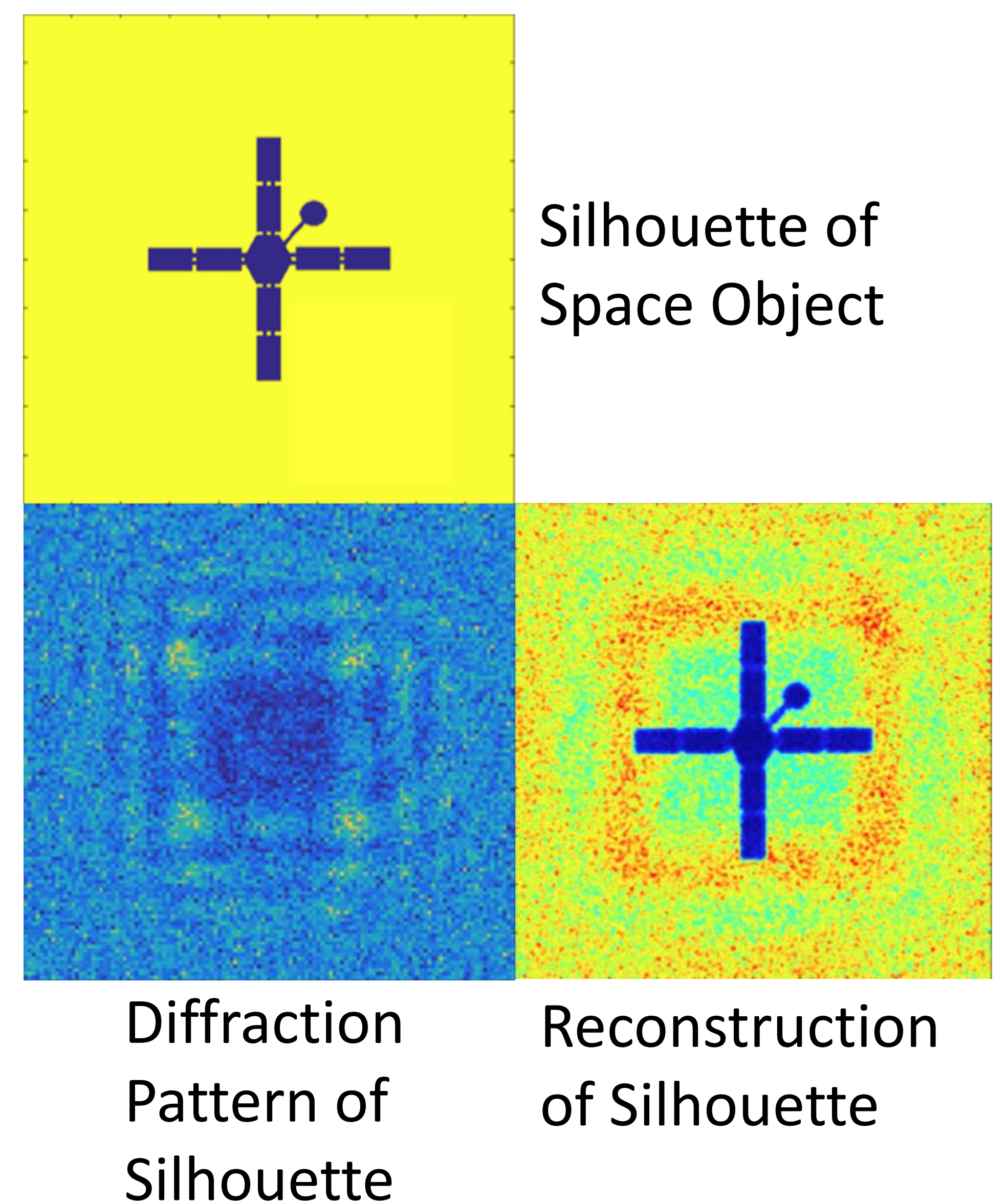
• Interest: Algorithms and software for Amon-Hen

Shadow Image Reconstruction

Objective: High resolution silhouettes of GEO satellites from measured intensity shadows

Result:

- Efficient implementation of multi-step Fresnel integral version of Gerchberg-Saxton phase retrieval algorithm.
- Sub-meter imaging resolution on GEO satellites using linear array of small inexpensive collection apertures.
- Below: high-fidelity simulation results for reconstruction of a silhouette from a linear array of small "photon bucket" collectors of the shadow intensity (a diffraction pattern)



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