Observing Scenarios and Throughput Estimates for the Space Interferometry Mission

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Abstract

The Space Interferometry Mission (SIM) will measure stellar positions with astrometric accuracy of 1 microarcsecond for a single differential measurement within a narrow angle field (1 degree in diameter) and of 10 microarcseconds for a single measurement in a wide angle field (15 degrees in diameter).

Three SIM Key Projects involve astrometric detection of planets via stellar reflex motions. A key issue is that rotation or linear acceleration of the local reference frame can be confused with the astrometric signature of a long-period planet. The problem is to identify a 'quasi-inertial' local reference frame i.e., one effectively free of rotation and linear acceleration.

We have investigated these effects via simulations; guided by the results we present viable arrow-angle observing scenarios for astrometric planet detection with SIM. We also discuss observing scenarios for wide angle astrometry programs. Finally, we give rough estimates of target throughput rates for these observing scenarios.

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Keywords: Space Interferometry Mission (SIM), astrometry, planet detection