

The Influence of Massive Companions on the SIM\Celestial Reference

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ABSTRACT

The Space Interferometry Mission (SIM) is a 10 meter Michelson space-based optical interferometer designed for precision astrometry ($4 \mu\text{as}$, $2 \mu\text{as/yr}$) with better accuracy hoped for over a narrow field of view. It is intended to search for planets and investigate a number of problems in Galactic and extra-galactic astronomy.

The accuracy and stability of SIM's celestial reference frame is subject to degradation from the reflex motion induced by massive companions of the reference objects over the 5 year mission. We present the results of simulations which show the sensitivity of reference frame accuracy to companions as a function of mass and period. The implications for planet detection will be briefly explored. We will focus on the components of reflex motion that will not be absorbed by the standard astrometric parameters of position, parallax, and proper motion and the consequences for mission accuracy. Lastly, we discuss the suitability of A-V, G-V, and K-III stars as reference objects in light of our simulations of companion induced reflex motion and suggest directions for further research on this problem.

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