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Expected Assuracy of Exoplanet Characterization with the SIM Observatory

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Detection of habitable exoplanets is one of the main objectives of the SIM Lite Observatory mission (NASA, currently in phase B). A recently conducted double blind test demonstrated that rocky, Earth-sized planets in the habitable zones of nearby stars ($< \sim$15 pc) can be confidently detected with SIM if it works within the goal specifications, even in the presence of other giant planets in multiple systems. SIM is a Michelson-type optical interferometer, and its exoplanet detection method is based on the relatively novel technique of narrow-angle differential astrometry. Apart from the ability to detect habitable planets, which is firmly established now, a more subtle issue of the accuracy of the estimated parameters, such as mass and orbital elements, should be resolved. The latter are of importance for the considered follow-up with the means of direct imaging, e.g., with the Terrestrial Planet Finder coronograph. The impact of multiple planets, parallax, seasonal gaps in the observing cadence and other adverse effects is investigated by means of statistical analysis based on the Cramer-Rao theorem. We also give an account of the ongoing work to support these semi-analytical considerations with computer-extensive Monte-Carlo simulations.