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Simulations of Detectability of Extrasolar Planets by a Joint Doppler and WFIRST-AFTA Coronagraph Survey ASHLEY CHONTOS, Stanford University, State University of New York at Albany, BRUCE MACINTOSH, Stanford University, ERIC NIELSEN, Stanford University, SETI Institute
— A long-term goal for the astronomical community is to image and characterize an Earth-like planet. The WFIRST-AFTA space mission will make advancements towards this goal. WFIRST will include a coronagraphic instrument to discover and characterize new exoplanets and to better characterize already known exoplanets. Although the WFIRST coronagraph will be very powerful, mission time to discover new planetary systems is limited. Identifying promising targets in advance could significantly enhance the scientific yield. We present results of simulations using a Doppler survey to find lower mass planets as possible targets for WFIRST. For simulations, simplified completeness estimates (Howard & Fulton 2014) are used to test the sensitivity of a prospective Doppler campaign. We use data from the HARPS spectrograph to determine exposure times needed to achieve 1 m/s uncertainty. Stellar jitter was randomly sampled from a uniform distribution based on spectral type, treating OBA-type, FGK-type, and M-type stars separately. For survey parameters, we use campaign parameters from the WIYN telescope, assuming 10 hours per night at 100 nights per year over 6 years. In any one simulation, we find roughly 45-50 new planets that are potentially observable by WFIRST. By limiting our targets to FGKM type stars within 10 parsecs, we expect one of those planets to be less than 10 Earth masses.

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