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A low-mass sub-Neptune planet transiting the bright active star HD 73344

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Planets with radii between 2-4 times that of Earth, closely orbiting solar-type stars, offer a unique window into the transition from rocky to giant planets. They are prime targets for atmospheric characterization using missions such as JWST and ARIEL. However, only a limited number of such planets, with accurately measured masses, are known to orbit bright stars. In this study, we confirmed the detection of a candidate planet orbiting at Pb~15 days around the very bright star HD 73344 ($V_{\text{mag}}=6.9$) using photometric observations from K2, TESS and Spitzer. In addition, we analyzed the large amount of radial velocity (RV) observations we made during an intensive multi-year campaign with the SOPHIE/OHP and HIRES/Keck spectrographs. Despite the transiting planet orbits a bright star at a short period, challenges posed by stellar activity hindered precise mass measurements despite intensive RV monitoring efforts. We propose a new observing strategy, targeting the star at high cadence, and show that this can provide better constraints on stellar variability and improve mass characterization. The latter will be essential if we are to characterize the atmosphere of planets around F-type stars using transmission spectroscopy.

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