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Generation of a green astro-comb using tapered photonic crystal fibers DAVID PHILLIPS, ALEXANDER GLENDAY, CHIH-HAO LI, GABOR FURESZ, NICHOLAS LANGELLIER, Harvard-Smithsonian, MATTHEW WEBBER, Northeastern University, GUOQING CHANG, LI-JIN CHEN, HUNGWEN CHEN, JINKANG LIM, FRANZ KAERTNER, Massachusetts Institute of Technology, ANDREW SZENTGYORGYI, RONALD WALSWORTH, Harvard-Smithsonian — Searches for exoplanets using precision stellar radial velocity (PRV) measurements are approaching Earth-like planet sensitivity. Astro-combs, which consist of a laser frequency comb, coherent wavelength shifting mechanism (such as a doubling crystal or photonic crystal fiber), and a mode-filtering Fabry-Perot cavity, provide a promising route to increased accuracy and long-term stability of the astrophysical spectrograph wavelength calibration. To find an Earth-like exoplanet around a Sun-like star requires astro-combs that cover the visible spectral bands in which there is maximal stellar photon flux and rich high-quality spectral features for high-sensitivity PRV measurements. However, currently no comb lines are available directly from mode-lock lasers in the visible band. Here, we report generation of a green astro-comb from an octave spanning Ti:Sapphire laser, spectrally broadened by a custom tapered PCF to the visible band via fiber-optic Cherenkov radiation for frequency shifting, and filtered by a broadband Fabry-Perot cavity constructed by a pair of complementary chirped mirrors.

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