

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

A Robust Green Astro-Comb for Earth-Like Exoplanet Searches

AAKASH RAVI, Department of Physics, Harvard University, DAVID PHILLIPS, Center for Astrophysics, Harvard Smithsonian, NICHOLAS LANGELLIER, TIMOTHY MILBOURNE, Department of Physics, Harvard University, MAYA MIKLOS, Harvard University, RONALD WALSWORTH, Center for Astrophysics, Harvard Smithsonian — One technique for detecting exoplanets (i.e. planets outside our solar system) is the radial velocity method. This technique works by observing, in a star-exoplanet system, the periodic shifts in the stars spectral lines caused by the gravitational influence of an orbiting planet. Detecting Earth-sized planets around Sun-like stars is very challenging as it requires extremely precise calibration and characterization the of astrophysical spectrographs used to make such measurements. To address this challenge, we employ a visible wavelength laser frequency comb as a wavelength calibration source. Our frequency comb calibrator, known as an astro-comb, is realized by spectrally broadening and shifting the output of a 1 GHz repetition rate modelocked Ti:sapphire laser using a photonic crystal fiber and then filtering the comb lines to create a coarse-toothed comb with 16 GHz line spacing. Our astro-comb system has been deployed at the TNG telescope on La Palma, Spain to calibrate the HARPS-N spectrograph. Here, we present improved spectral broadening techniques, a wider comb-spacing implementation for instrument profile characterization, and ongoing comb-calibrated astrophysical measurements, including measurements of solar radial velocities.

David Phillips
Harvard - Smithsonian Center for Astrophysics

Date submitted: 31 Jan 2019

Electronic form version 1.4