Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Demonstration of enhanced spectral broadening of frequency combs for astro-combs used in Earth-like exoplanet searches AAKASH RAVI, Department of Physics, Harvard University, DAVID PHILLIPS, Harvard-Smithsonian Center for Astrophysics, NICHOLAS LANGELLIER, TIMOTHY MILBOURNE, MAYA MIKLOS, Department of Physics, Harvard University, RONALD WALSWORTH, Harvard-Smithsonian Center for Astrophysics and Department of Physics, Harvard University — 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-mass planets around Sun-like stars is very challenging, requiring extremely precise calibration 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 calibrator, known as an astro-comb, is realized by spectrally broadening and shifting the output of a 1 GHz repetition rate mode-locked 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 implemented at the TNG telescope on La Palma, Spain to calibrate the HARPS-N spectrograph. Here, we present several enhancements to the spectral broadening component which we are fabricating for use with a fully automated Ti:Sapphire laser. We also present ongoing comb-calibrated astrophysical measurements, including measurements of solar spectra using a compact solar telescope.

David Phillips
Harvard-Smithsonian Center for Astrophysics

Date submitted: 25 Jan 2018 Electronic form version 1.4