EMILIE: A New Spectrograph For Precise Doppler Studies

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Stellar radial velocities (RV) are proving to be an effective technique for searching for extrasolar planets. Several spectrograph specialized in precise Doppler shift measurement presently reach accuracies between 3 and 10 m/s. EMILIE is a new fiber-fed echelle spectrograph dedicated for better RV observations. Using a 204×408 mm echelle grating and a 1k×1k CCD detector, it samples about 50% of the wavelength range between 420 and 660 nm (50 echelle orders) with spectral resolution R ~150 000. This spectrograph is coupled to the telescope via a single 50 micron-fiber, which accept 2.7 arcsec from the sky, and an imageslicer. An automatic guiding and focusing system stabilizes the rapid image motion caused by atmospheric turbulence at the entrance of the fiber. This fiber transmits alternately to the spectrograph the stellar beam and the reference beam. The same pixels of the CCD detector are used alternately for the two spectra. The excellent short term stability needed is obtained by introducing EMILIE in a vacuum tank, with active thermal control. The instrument is at the present time being installed at the focus of the 1.52 m Coude telescope at the Haute-Provence Observatory and will be used, alone, or as a part of the Absolute Astronomical Accelerometry (AAA) project. Preliminary results are presented.