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Title:	A Prototype Fringing Spectrograph for Sensitive Extra-solar Planet Searches and Astroseismology studies
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Abstract

We have developed a prototype fringing spectrograph optimized for sensitive stellar radial velocity measurements, aimed at detecting small extra-solar planet velocity perturbation and stellar seismology on an amplitude of ~ 1 m s(-1) or less. It is a combination of an angle-independent interferometer and a high throughput intermediate resolution spectrograph. The interferometer is used for measuring phase shifts caused by radial velocity variations of star light, while the spectrograph is applied for dispersing broad-band white fringes into different color channels to increase fringe visibility for precision phase measurements. A much simplified instrument response function (PSF), determined only by phase, amplitude and offset, compared to much more complicated ones in conventional echelle spectrographs, provides unprecedented sensitivity for radial velocity measurements. Preliminary lab-based experiments with this prototype instrument demonstrate 0.7 m s(-1) accuracy for short term radial velocity measurements. The zero point drift over 11 days was within 4 m s(-1) and may be due to the lack of interferometer stabilization during these runs. Stabilization is now being implemented through a close-loop electronics. This is expected to improve long term velocity measurement accuracy and make the instrument ready for first-light stellar observations. The instrument is also being tested with sunlight. The diurnal velocity variation caused by the Earth's rotation has been observed. Work to measure solar P-mode 5 minute oscillations is underway. This work is supported by the LLNL Laboratory Directed Research and Development (LDRD) grant through track 98-ERD-054.