The Astrophysical Journal, 593:L147–L147, 2003 August 20

ERRATUM: "FIXED DELAY INTERFEROMETRY FOR DOPPLER EXTRASOLAR PLANET DETECTION" (ApJ, 571, L165 [2002])

Jian Ge
Department of Astronomy and Astrophysics, Pennsylvania State University, University Park, PA 16802; jian@astro.psu.edu

Early high-precision Doppler radial velocity measurements using a wide-angle Michelson interferometer with a fixed optical path difference, or fixed delay interferometer, include Barker & Hollenbach (1972), Gorskii & Lebedev (1977), and Beckers & Brown (1978). This interferometer with a narrow bandpass has been successfully used for very high Doppler precision measurements of the Sun (~3 m s^{-1}; Kozhevatov, Kulikova, & Cheragin 1995, 1996; submeter per second precision for the Global Oscillation Network Group measurements; J. Harvey 2002, private communications). The same kind of instrument was proposed and used for measuring upper atmospheric winds and temperatures from naturally occurring visible region emissions (Shepherd et al. 1985).

It should have been mentioned in Ge (2002) that D. J. Erskine at the Lawrence Livermore National Laboratory (LLNL) proposed to combine a wide-angle Michelson interferometer with a fixed delay with a medium-resolution spectrometer to increase the bandpass for precision Doppler extrasolar planet searches in 1997. The first prototype was constructed by him at LLNL and was called a fringing spectrometer. The lab experiments with this prototype demonstrate ~1 m s^{-1} Doppler precision, and the instrument is stable to about 4 m s^{-1} over a 2 week period (Erskine & Ge 2000). The postdisperser has a resolving power of $R = 20{,}000$. The bandwidth is ~140 Å with a 2500 × 600 pixel CCD array. This prototype was modified by Ge, Erskine, & Rushford (2002) and used for the first light observing with starlight at the Lick 1 m telescope in 1999 December (Ge et al. 2002). The resolving power is $R = 5600$, and the bandpass is 340 Å. The results from Arcturus over an ~1.5 hr period show that the velocity varies about 30 m s^{-1}. Since the daytime calibration of the instrument shows that the instrument drift is about 7 m s^{-1} over a similar time frame, the velocity variation is likely caused by the stellar oscillation. Details about the instrument design and initial observation results were reported in Ge et al. 2002). In this paper, the instrument was named as an externally dispersed interferometer to distinguish its nature from previous internally dispersed interferometers with variable optical delays (e.g., Connes 1985; Frandsen, Douglas, & Butcher 1993; Douglas 1997; Harlander, Reynolds, & Roesler 1992).

REFERENCES

Barker, L., & Hollenbach, R. 1972, J. Appl. Phys., 43, 4669
Beckers, J. M., & Brown, T. M. 1978, Osser. Mem. Astrophys. Obs. Arcetri. No. 106, 189
Connes, P. 1985, Ap&SS, 110, 211
Douglas, N. G. 1997, PASP, 109, 151
Erskine, D. J., & Ge, J. 2000, in ASP Conf. Ser. 195, Imaging the Universe in Three Dimensions: Astrophysics with Advanced Multi-Wavelength Imaging Devices, ed. W. van Breugel & J. Bland-Hawthorn (San Francisco: ASP), 501
Frandsen, F., Douglas, N. G., & Butcher, H.R. 1993, A&A, 279, 310
Ge, J. 2002, ApJ, 571, L165
Ge, J., Erskine, D. J., & Rushford, M. 2002, PASP, 114, 1016
Gorskii, S. M., & Lebedev, V. P. 1977, Izv. Krymskoi Astrofiz. Obs., 57, 228
Harlander, J., Reynolds, R. J., & Roesler, F. L. 1992, ApJ, 396, 730
Kozhevatov, I. E., Kulikova, E. K., & Cheragin, N. P. 1995, Astron. Lett., 21, 418
———. 1996, Sol. Phys., 168, 251
Shepherd, G., et al. 1985, Appl. Opt., 24, 1571