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SPECTROSCOPY OF FAINT CATACLYSMIC VARIABLES II

EF Pegasi

Recently, Howell et al. (1993) studied a rare outburst of EF Peg and showed that the star is a large amplitude dwarf nova with a likely orbital period of 2.05 hrs. Figure 1 shows the energy distribution of EF Peg in the visible. We note a steep blue continuum and the appearance of strong emission lines of H apparently superimposed on weak broad absorption in the higher members. He lines in emission are also present but weaker. Our MMT magnitude indicates that EF Peg was observed when ~1 mag brighter than its quiescent value. If EF Peg had been observed rising to or falling from an outburst, it would explain the steep blue continuum and the weak absorption. However, AAVSO records (Mattei 1993) show no observation of an outburst for ±30 days from our observation. The steeply rising blue continuum (approximately Rayleigh-Jeans) may therefore indicate a hot component in the system. Apparently EF Peg was slightly brighter in quiescence than in 1993, a situation that is known to occur in a number of dwarf novae (Howell et al. 1991). There is no indication of a secondary star seen in the spectrum.

KQ Pegasi (PG2240+193)

KQ Peg is a relatively bright object discovered in the PG survey. Green et al. (1982) found that Hα was in emission while the higher Balmer lines were in absorption. They also suggested that there may be Fe II emission in the spectrum. Szkody and Howell (1992) show a spectrum from 4400-5000Å in which Hβ and Hγ are both in absorption as well as HeI 4471. The line profiles are asymmetric with a possible cause being weak underlying emission cores.

A spectrum obtained by Ringwald (1993) shows Hα and Hβ in emission while the later Balmer lines are in absorption. His interpretation of this system is a sdB-O star, possibly with a long period orbit. Howell et al. (1991) provide a 3.5-hour-long lightcurve which is constant to within 0.05 mags, consistent with a long orbital period for KQ Peg.

An examination of our data (Fig. 2) shows that the hydrogen lines are too narrow in absorption to be attributed to a disk. The Balmer series lines in our data show a FWHM of ~27Å. This is comparable to that predicted for sdB-O stars with log g=5 (FWHM ~24Å; Bergeron et al. 1992), but much too narrow for a DA white dwarf of log g=8 (FWHM ~80Å; Wesemael et al. 1993). The system could be a pre-cataclysmic binary, with a low mass main sequence secondary undetected in the spectrum other than by the emission line cores caused by reprocessing of the hot star flux on the facing side of the companion. This may result in sinusoidal periodic variations in the line strengths (except when viewed pole-on), but the continuum may not be varying significantly at optical wavelengths and the effect of emission lines on broad-band magnitudes may not

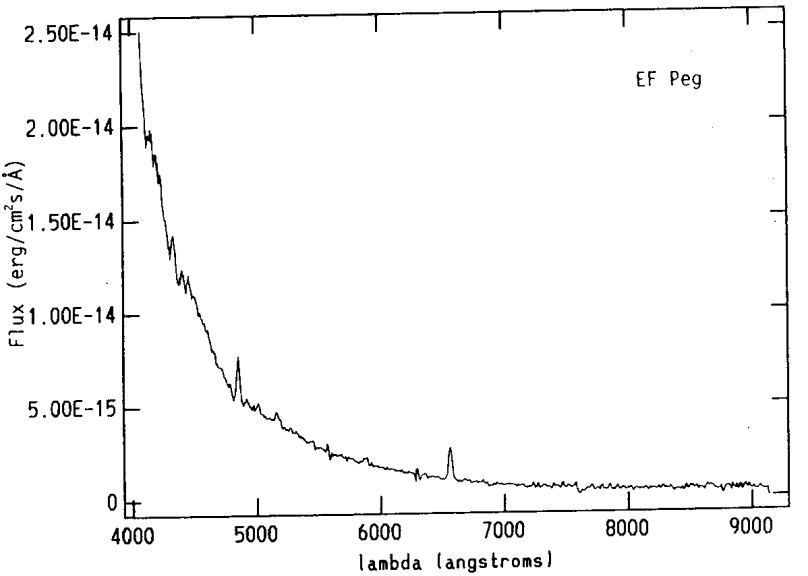

Figure 1. MMT spectrum of EF Peg.

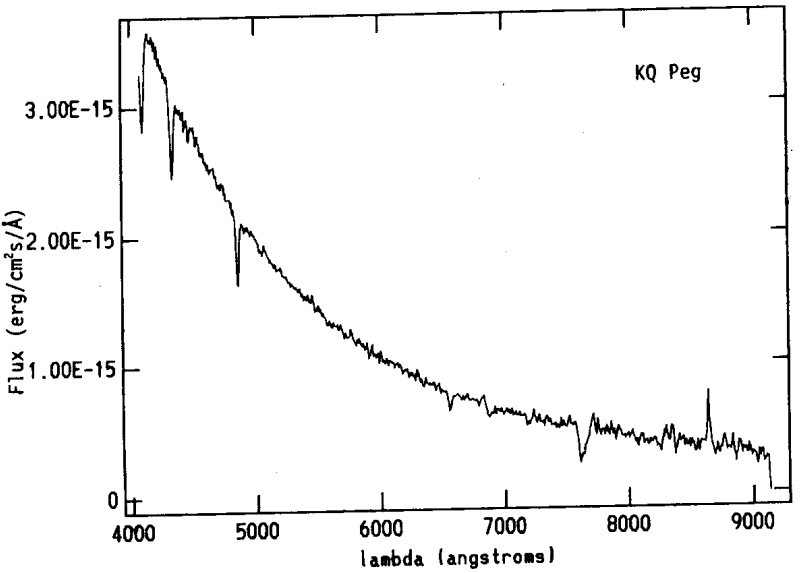

Figure 2. MMT spectrum of KQ Peg.

with a more spectacular spectrum is BE UMa (Ferguson et al. 1987). Few objects with hot subdwarf primaries are known, and the evidence for reprocessing indicates that this may be a pre-cataclysmic system with an orbital period of a few days or less.

The new data seen in Figure 2, show all the Balmer lines in absorption and the profiles appear symmetric. HeI 4471 is present in absorption as well. Apparently any emission seen in earlier data is now weak or absent, possibly due to the orbital modulation mentioned above and not some long-term change. No secondary star features are seen but weak features from a K star may be undetected at this resolution.

Observations reported here were made at the Multiple-Mirror Telescope.

Table 1. Observing log

Star	UT Date	UT Start	Int. Time	Spectral Resolution	V[a)]
EF Peg	1992 Sep 02	03:19	3600 sec	15Å	17.7
KQ Peg	1992 Sep 02	06:14	600 sec	15Å	16.0

[a)] V magnitude derived from numerical filter convolutions of the spectra.

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