Mg II EMISSION OF POP. II LONG-PERIOD CEPHEIDS

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ABSTRACT

The Population II Cepheid pulsational variables AL Vir (P = 10.3 days) and W Vir (P = 17.3 days) were observed with IUE at two phases each. Only low-dispersion mid-UV exposures were feasible, but were sufficient to show a great range in Mg II emission behavior. The relationship to phase variation of emission in classical (Pop. I) Cepheids of long period is unclear.

RESULTS

W Vir showed Mg II 2800 emission well in excess of the local continuum at both times (JD 2445561.65 and 2445755.18). The FES magnitudes at these two times were 10.0 and a faint 10.7. This means that the second observation was taken near minimum light. The actual phase values are in doubt, pending investigation of recent ground-based data, since the period and form of light curve are known to vary. If we adopt the elements 2436576.687 + 17.2736 E from the Second Supplement to the Third Edition of the General Catalogue of Variable Stars, the provisional phases are 0.16 and 0.36, respectively.

AL Vir showed only photospheric absorption in Mg II at both times (JD 2445561.75 and 2445755.11). FES magnitudes were 9.5 and 10.1, and provisional phases from 2437823.45 + 10.30256 E are 0.10 and 0.87. The spectrum resembles early F-type luminous stars with their pronounced Fe II absorption features.

DISCUSSION

Schmidt and Parsons (1982, 1984) found that among classical Cepheids with periods near 10 days, Mg II emission strength builds rapidly at the time of maximum outward acceleration of the photosphere, around phase 0.7--

0.8. This emission subsequently fades toward much smaller but still detectable levels at minimum light. In this framework, the observations of both Pop. II Cepheids are surprising.

If similar mechanisms of shock heating and radiational cooling operate in both population types with similar efficiencies, then AL Vir should have had detectable emission, and the enormous emission in W Vir is unexpected. There is a trend among Pop. I Cepheids for greater overall emission strength at longer periods; the current sample of two stars would give a much steeper slope to such a trend. There are too many variables, however, including differences in light curve shape (i.e. pulsation dynamics), to be able to conclude at present whether the abundance differences between Pop. I and Pop. II have a direct affect on the nature of Cepheid chromospheres.

REFERENCES

Schmidt, E.G., and Parsons, S.B. 1982, Ap.J. Suppl., 48, 185.

Schmidt, E.G., and Parsons, S.B. 1984, Ap.J., 279, ___. (April 1)