

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2060

Rothney Astrophysical Observatory Publication

Series B. No. 8

Konkoly Observatory
Budapest
1981 December 17
HU ISSN 0374-0676

OPTICAL OBSERVATIONS OF THE PRIMARY MINIMUM OF THE SOLAR-
TYPE BINARY AI Phe WITH THE IUE SATELLITE

In an extension of a program to study the ultraviolet center-to-limb variation in the sun, we have used the International Ultraviolet Explorer Satellite (IUE) to observe the flux during the eclipse of the G2 component of the 24^d.6 totally eclipsing system AI Phoenicis.

Previous uvby studies of this system reported by B. Reipurth (IBVS No. 1419, 1978) established that the primary eclipse was total. M. Imbert's (Astron. and Astrophys. Suppl. 36, 453, 1979) spectroscopic study indicated that the apparently cooler component was of spectral type G5, slightly more massive, and slightly more luminous than the hotter star.

We anticipated that, although the cooler star might be slightly evolved, the components would not be strongly interacting and that the conditions of a lengthy eclipse (13^h) and relatively bright system magnitude ($8.5 \leq V \leq 9.2$) would permit a sufficient number of IUE exposures to determine the UV limb-darkening.

On UT August 20-21, ten LWR spectra were obtained in two successive eight-hour shifts at Goddard SFC and at Vilspa, covering totality and the rising branch. Features are discernible to at least 2600Å on the least well exposed frame. Fine Error Sensor (FES) flux readings were taken before and after each exposure to tie in the light curve variation. An algorithm of

A. Holm and G. Rice (private communication, 1981) was used to convert FES flux to V magnitude:

$$V = -2.5 \log \left[\frac{C}{1 - 1.6d \exp(-4)C^{0.781}} \right] + 16.58 - 0.24 (B-V).$$

The results appear in Figure 1, with the time of IUE exposures indicated by shaded bars. The phase is computed using Reipurth's ephemeris, with which our data appear to be in reasonable agreement.

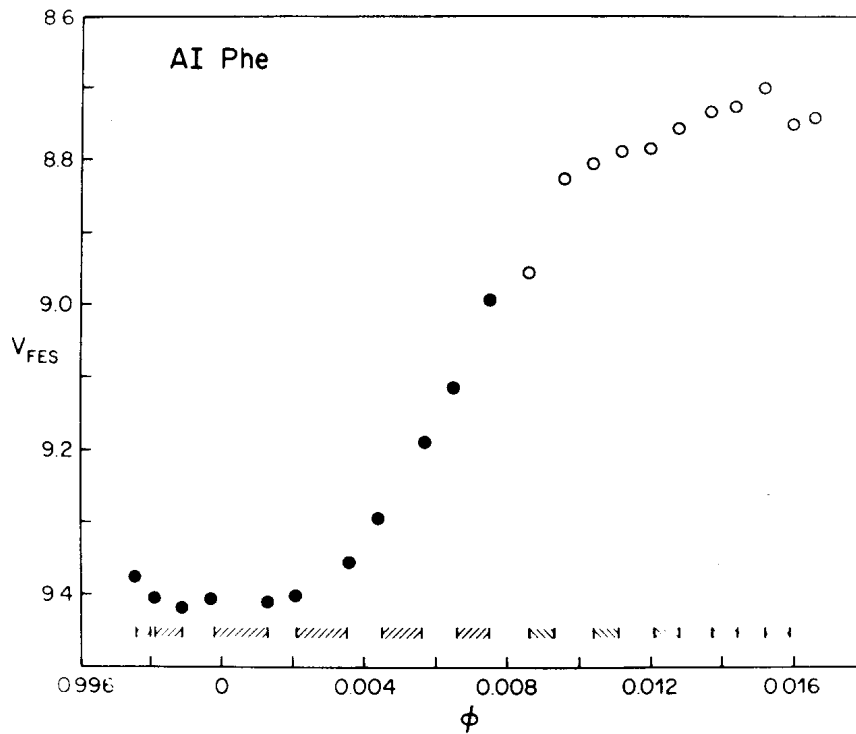


Figure 1

One of us (BJH) obtained ground-based UBVR observations and spectra at CTIO and another of us (I. Shelton, resident observer of the David Dunlap Observatory, University of Toronto Station at Las Campanas) obtained UBVR observations at Las Campanas. The value of B-V used in the above

equation came from a preliminary reduction of these ground-based data. The reduced light curves will be modeled in five colors, and the resulting improved elements used in the determination of the center-to-limb variation in the eclipsed component. The V data from the different sources show rough agreement in amplitude and shape except at the high shoulder. These results suggest that the duration of totality is at least 105 minutes and perhaps as long as 140 minutes, therefore longer than the 80 minutes of totality in Reipurth's report. The fully reduced photometric data and the spectra will be discussed elsewhere.

E.F. MILONE, B.J. HRIVNAK, T.A. CLARK,
RAO, University of Calgary,
O. KJELDSETH MOE,
Institute of theoretical Astrophysics,
University of Oslo,
J.C. BLADES, Resident Astronomer,
Villafranca del Castillo Satellite Tracking
Station, Madrid,
I. SHELTON,
DDO, The University of Toronto.