

MQ SERPENTIS, A MYSTERY

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Abstract

MQ Serpentis (5 Ser, BD +2° 2944, HR 5694, ADS 9584) has been catalogued as a variable with amplitude of only 0.1V magnitude. Before the days of UBV it was suspected of being variable. It seems probable that the variable is not the primary of the 5.11V magnitude double but rather is its 10th magnitude companion at 11 arcseconds away, with a predicted amplitude of about two magnitudes.

In the Yale Observatory plate stacks there is a series of parallax plates on HR 5694, ($15^{\text{h}}16^{\text{m}}45^{\text{s}} + 01^{\circ} 57'2''$ (1950)), taken by Harold Alden with Yale's 26-inch refractor at Johannesburg, South Africa, between 1932 and 1934. The record books kept at the telescope indicate the star as a variable. It is not listed in either the *General Catalogue of Variable Stars* (Kholopov *et al.* 1985a)(GCVS) or the *New Catalogue of Suspected Variables* (Kholopov *et al.* 1982)(NSV). However, in the "67th Name-List of Variable Stars" (Kholopov *et al.* 1985b) it is designated MQ Ser. The variability was discovered in 1983 by G. Bakos, who observed the star photoelectrically between 1977 and 1982. He found an amplitude of 0.1V magnitude and described the variation as "Flare activity". So small an amplitude could not have been detected in the 1930's. I hoped that there might be evidence of a previous more spectacular outburst, not reported because unconfirmed. A search of Alden's publications and his correspondence with Frank Schlesinger, then Director of the Yale Observatory, yielded no clues.

The Yale parallax plates that were taken through an objective grating giving a 2.5 magnitude difference between the central image and the first order spectrum clearly separate the 10th magnitude companion at 11" from the primary, except that the secondary falls within the photographic halo surrounding the central image of the primary. Although a slight variation of either the secondary or the first-order spectral image of the primary is suspected, the circumstances are not favorable for definitive conclusions on variability.

From Bakos' description of the flare activity, the star could be either of the UV Cet or Z Cam type. According to the GCVS the flares of UV Cet stars have durations on the order of only minutes, whereas Bakos describes the flares of MQ Ser as lasting several days. However, he made only one observation a day, so that very short periods cannot be ruled out. On the other hand, the outbursts of Z Cam stars do have durations consistent with Bakos' observations on durations, and moreover on the characteristic intermediate rather than minimum magnitude between some successive outbursts. However, the amplitudes of Z Cam stars range from 2 to 5 magnitudes.

Let us assume that Bakos' measurements represent the blend of the two components of ADS 9584, magnitude 5.11 F8V + magnitude 10 M0. Then, if the secondary flared by at least 2 magnitudes, the combined light would show an amplitude of 0.1 magnitude, as Bakos found. In addition, he remarked that the star at maximum was redder than at minimum. In view of the late spectral type of the companion this is consistent with the interpretation that the variable is indeed the red

secondary component of the binary, whose contribution to the total light at minimum would be negligible.

Bakos also studied another similar star, omicron Aql, (HR 7560, ADS 13012AC, magnitude 5.11 F8V + magnitude 13.8 dM4, sep. 22"), not yet included in the GCVS, NSV, or later Name-Lists. It would be beneficial to the understanding of these stars if observers with telescopes giving high spatial resolution could make long nightly runs on these stars, provided the glare of the primary would not be overwhelming.

The mystery remains: why did Alden suspect HR 5694 or its companion of being variable more than 50 years before Bakos' discovery?

References

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