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A NEW ULTRA-SHORT PERIOD DWARF NOVA: SW URSAE MAJORIS

The orbital period of the dwarf nova SW UMa has been determined from radial velocity variations of the Hα emission line. The observations were obtained on 1982 Dec 27, and 1983 Feb 11-13 UT using the Mt. Lemmon 1.5-m reflector equipped with a Robinson-Wampler Image Dissector Scanner (Robinson and Wampler 1972). The radial velocities of the emission lines were measured using the method described in Shafter (1983). The resulting measurements yield the following ephemeris for the time of superior conjunction of the source of the broad Hα emission (i.e. the accretion disk surrounding the white dwarf):

$$T = \text{HJD } 2445376.8601 \pm .0008 + 0.0567433 \pm .0000025\ E.$$

The orbital period of 0.0567433 days is the second shortest of any known dwarf nova. The dwarf nova WZ Sge has an orbital period which is ~ 5 seconds shorter (Robinson, Nather, and Patterson 1978).

In addition to the similarity of their orbital periods, SW UMa and WZ Sge have several other properties in common. For example, the amplitude of the radial velocity variation, K_1, is 47 ± 4 km s^{-1} for SW UMa as compared to the upper limit of 38 km s^{-1} for WZ Sge obtained by Krzeminski and Kraft (1964). The relatively low value of K_1 for both of these systems is certainly not a result of low orbital inclination because, as is well known, WZ Sge is an eclipsing system while, in the case of SW UMa, the emission lines are quite broad (FWHM ≅ 1300 km s^{-1}) and there appears to be an ~ 30% modulation in the light curve with the orbital period indicating that $i > 40°$ (Szkody 1983, private communication). Consequently, it appears that SW UMa like WZ Sge has a relatively large mass ratio, $q(=m_1/m_2)$.

In addition to their mass ratios, the outburst characteristics of the two stars appear to be somewhat similar. WZ Sge errupts every 32 years (Patterson et al. 1981) and, although the mean outburst period of SW UMa is not well known, it is probably also quite long (Glasby 1970). Finally, low dispersion spectra of SW UMa reveal broad Balmer absorptions at Hβ and Hγ.

Such absorptions are also seen in other ultra-short period dwarf novae for example T Leo (Shafter and Szkody 1983) and WZ Sge (Krzeminski and Kraft 1964).

T Leo and WZ Sge are probably SU UMa type dwarf novae (Shafter and Szkody 1983; Patterson et al. 1981). In view of the similarity of SW UMa to these two systems, it would not be surprising if SW UMa turned out to be a SU UMa system as well. With this possibility in mind, amateur astronomers are encouraged to monitor SW UMa in order to firmly establish its detailed outburst behavior.

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