COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4749

Konkoly Observatory
Budapest
16 August 1999

HU ISSN 0374 – 0676

THE SPECTRUM, PERIOD, AND PROPER MOTION OF V893 SCORPII

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The dwarf nova V893 Sco was recently recovered by Kato et al. (1998). Because its identification was obscure for so long, little is known about its outburst characteristics. I obtained spectra in 1999 June with the 2.4 m Hiltner telescope at MDM Observatory on Kitt Peak; details of the instrumentation, reduction and analysis were essentially identical to those in Thorstensen et al. (1998). There are 30 exposures of $\sim$ 180 s each.

Fig. 1 shows the mean spectrum, and Table 1 lists the spectral features detected. He II λ 4686 is somewhat stronger than usual for a dwarf nova, reminiscent of the X-ray emitter VZ Pyx (Remillard et al. 1994, Thorstensen 1997), and indeed Kato et al. (1998) note that V893 Sco is the likely counterpart of a ROSAT bright source. The emission lines are all double-peaked, with separation $\sim$ 1200 km s^{-1} in He I λ5876. The dips in the central cores of the emission lines appear somewhat deeper than usual, with the cores of He I extending down to the continuum in some exposures. The FWHM of the Hα emission is 43 Å. The continuum flux, which is uncertain by $\sim$ 30 percent, implies $V = 15.5$.

I measured radial velocities of Hα (Table 2) using a convolution method (Schneider and Young, 1980). The convolution function used had positive and negative Gaussians of 14 Å FWHM separated by 56 Å. This emphasized the steep sides of the line profile. Fig. 2 shows the period search 'residual-gram' (Thorstensen et al. 1996). It indicates a period near 0.0760 d, though a daily cycle count alias at 0.0822 d is possible. The Monte Carlo test of Thorstensen & Freed (1985) indicates that the $0^{\rm d}.0760$ period is preferred at the $\sim$ 98 per cent confidence level, so the choice is fairly secure but not definitive. Table 3 gives sinusoidal fits to the two aliases, of the form

$$v(t) = \gamma + K \sin[2\pi(t - T_0)]$$

Fig. 3 shows the velocities folded on each of the two best periods.

In addition to the spectra I acquired three 15-second V-band direct frames 1999 June 7.25 UT. Fig. 4 shows a finding chart. A fit of this image to the USNO A2.0 catalogue (Monet et al. 1996) and the Digital Sky Survey revealed significant proper motion since the plate from which these were derived (epoch 1977.5). The implied motion is 0.067 arcsec yr^{-1} in position angle 223 degrees, with an uncertainty of approximately 0.015 arcsec yr^{-1}.

All dwarf novae with periods similar to V893 Sco are SU UMa stars, which show superoutbursts and superhumps. As the photometric properties of V893 Sco are explored, it is very likely that it too will follow this pattern. The substantial proper motion and bright apparent magnitude both suggest a relatively small distance.

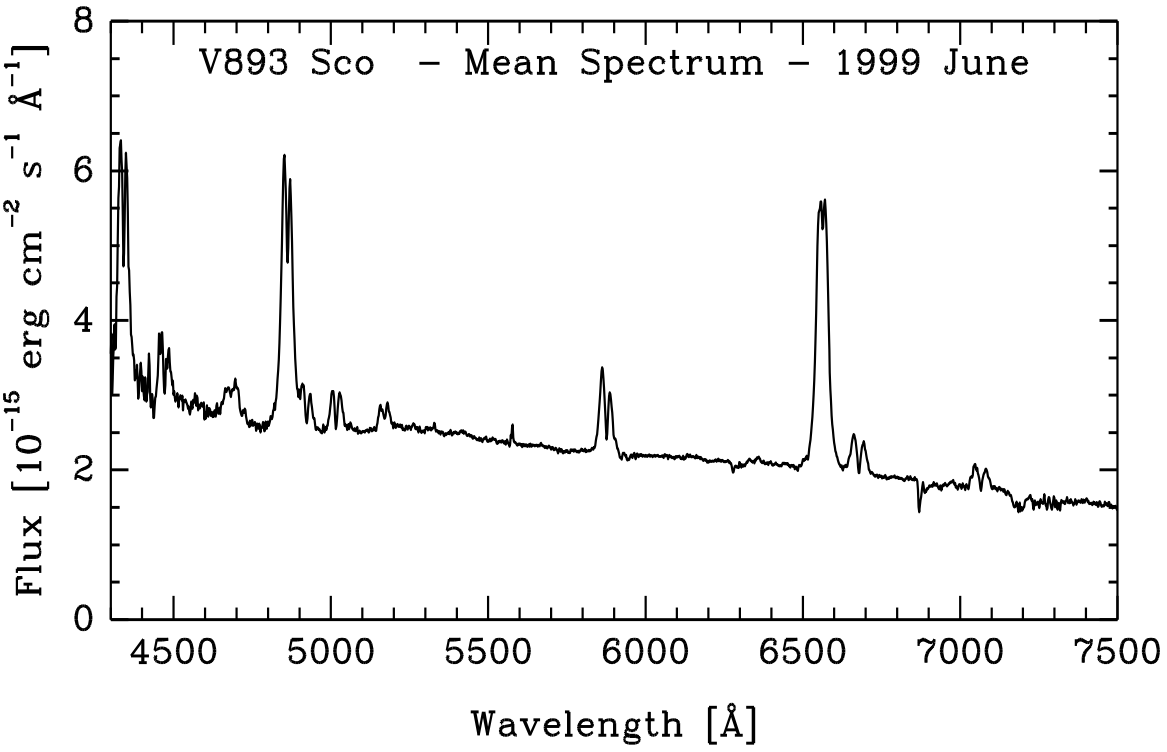

Figure 1. Mean spectrum of V893 Sco at minimum light.

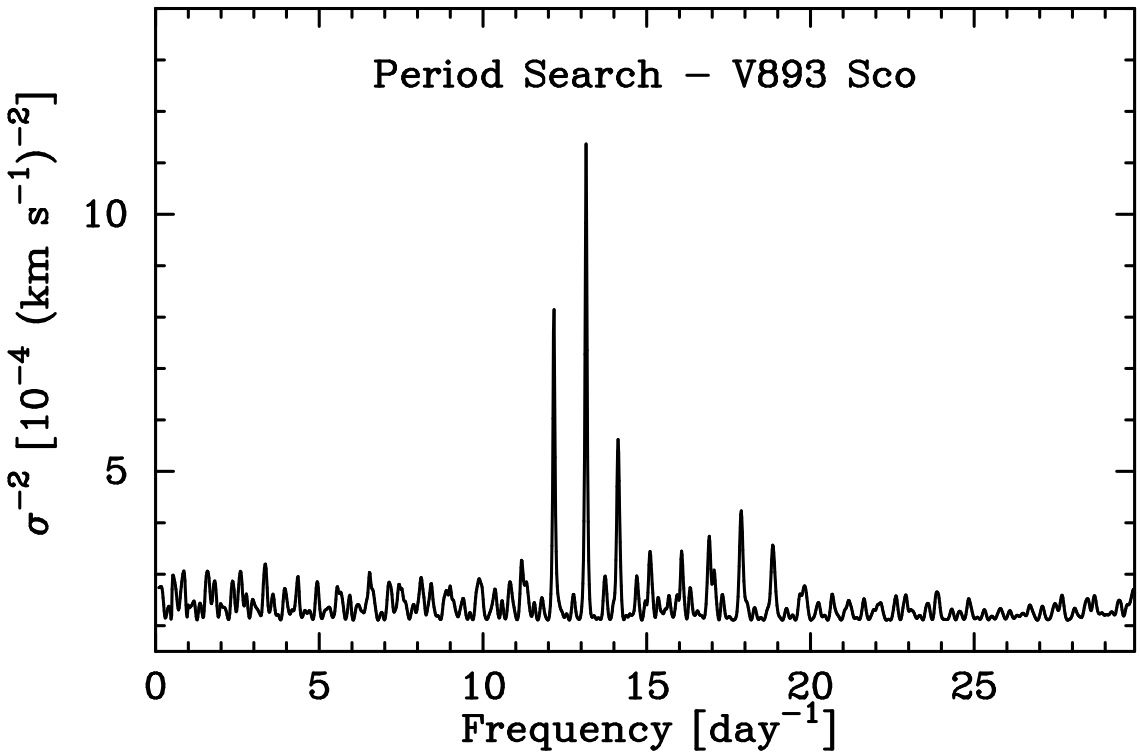

Figure 2. Periodogram of the Hα velocities.

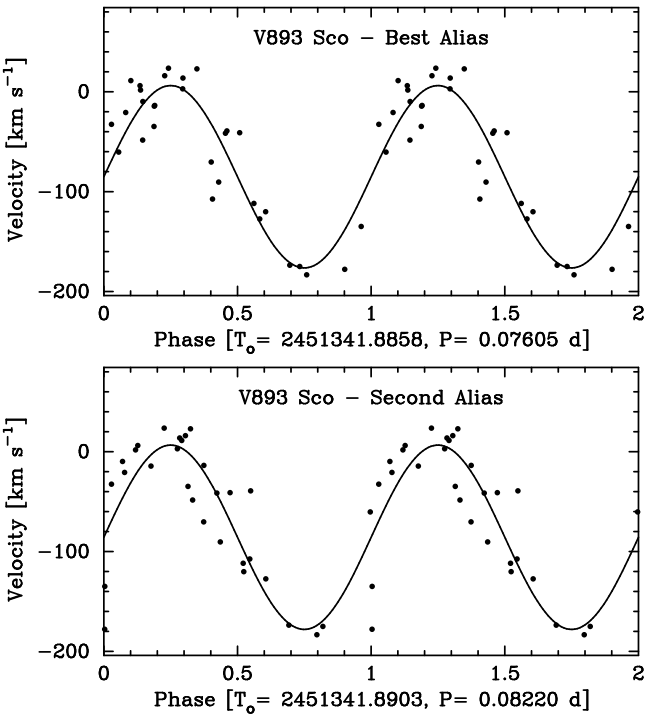

Figure 3. Velocities folded on the best period (upper panel) and on the second-best alias (lower panel). All points are shown twice for continuity.

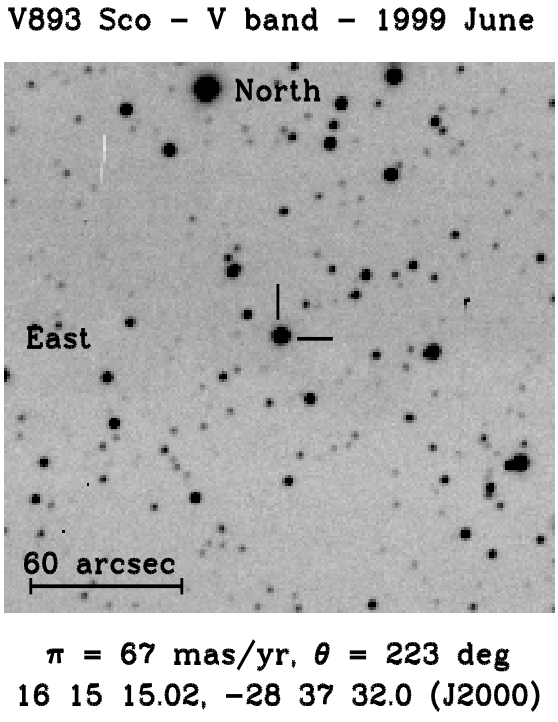

Figure 4. Finding chart for V893 Sco derived from a 1999 June V-band image. Orientation and scale are indicated, as is the position derived from a fit to USNO A2.0 stars.

Table 1: Spectral Features

Line	EW (Å)	F_λ[a]
Hγ	41	1.2×10^{-13}
HeI 4471	8:	2.4×10^{-14}
HeII 4686	9	2.5×10^{-14}
Hβ	59	1.5×10^{-13}
HeI 4921	4:	1.2×10^{-14}
HeI 5015	7	1.7×10^{-14}
HeI 5876	18	3.9×10^{-14}
Hα	84	1.7×10^{-13}
HeI 6678	11	2.1×10^{-14}
HeI 7027	7	1.1×10^{-14}

[a] Uncertain by ~ 30 per cent, in erg cm^{-2} s^{-1} Å^{-1}

Table 2: Radial Velocities of Hα

HJD[a]	v[b]	HJD	v	HJD	v	HJD	v
1338.7901	14	1340.8314	2	1342.6608	−14	1343.8856	3
1338.8547	−10	1341.6885	−107	1342.7574	−39	1343.8897	23
1339.7534	−135	1341.7262	−178	1342.8513	−174	1343.8937	−70
1339.7890	−90	1341.7510	16	1343.8654	−33	1343.8978	−41
1339.8784	−120	1341.7914	−183	1343.8694	−21	1343.9018	−41
1340.6832	−35	1341.8900	−60	1343.8734	6	1343.9059	−112
1340.7247	−175	1342.6540	11	1343.8775	−14		
1340.7893	−127	1342.6574	−48	1343.8816	24		

[a] Heliocentric Julian date of mid-integration, minus 2450000. [b] Units of v are km s^{-1}.

Table 3 Fits to Hα Velocities

T_0[a]	P (d)	γ (km s^{-1})	K (km s^{-1})	σ (km s^{-1})
1341.8858 ± 0.0012	0.07605 ± 0.00006	91 ± 9	-85 ± 6	30
1341.8903 ± 0.0014	0.08220 ± 0.00007	92 ± 11	-86 ± 7	36

[a] Heliocentric Julian date minus 2450000.

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