

Unusual Variability of TYC 5978 00472 1

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Star Name:	TYC 5978 00472 1, ASAS 072641–2208.9, NSVS 15394646, NSVS 15276801, NSVS 17947858		
Coordinates (J2000):	07 26 41.41, –22 08 53.7		
Variability type:	SRD: + E;;	Limits, System:	10.2 – 10.7 (V);
Period:	(see Remarks) d;	Epoch:	JD (see Remarks)

Remarks:

TYC 5978 00472 1 = ASAS 072641-2208.9 is listed in the ASAS-3 catalog of variable stars (Pojmanski 2002) as a "miscellaneous" variable star with the period of 0.249024 days.

I re-analyzed the ASAS-3 observations (additionally taking into account the sparse NSVS data (Wozniak et al. 2004)) using the period-search software developed by Dr. V.P. Goranskij for Windows environment. The star's brightness variations were found to be a superposition of two periodic components: a long-period (presumably pulsational) one and a much-shorter-period one, resembling, by its light curve shape, ellipsoidal variations of a binary system with a hint to a narrow eclipse at the primary minimum. The following light elements were determined:

	Period, day	Epoch, JD
pulsating component, P ₁	312	2453700.
eclipsing component, P ₂	8.2958	2453707.98

The star is not catalogued as a visual double star, and Schmidt photographs of the field available in data archives show its image not very different from those of single stars. The companion 2MASS 07264120-2208486 is much fainter than the variable (by 4–5 mag) and does not contribute much to the photometric data. There are no known X-ray sources at the position of the variable.

In our opinion, the star is a hierarchical multiple system or an optical system. It contains an ellipsoidal binary (with narrow eclipses) and a pulsating star. The amplitudes of both variations are larger than the observed combined-brightness amplitude. The presence of a Mira in the system is improbable taking into account the color indices (J–K = 0.303 in 2MASS; B–V = 0.056 in Tycho-2).

The unusual brightness variations of TYC 5978 00472 1 make its spectroscopy very desirable.

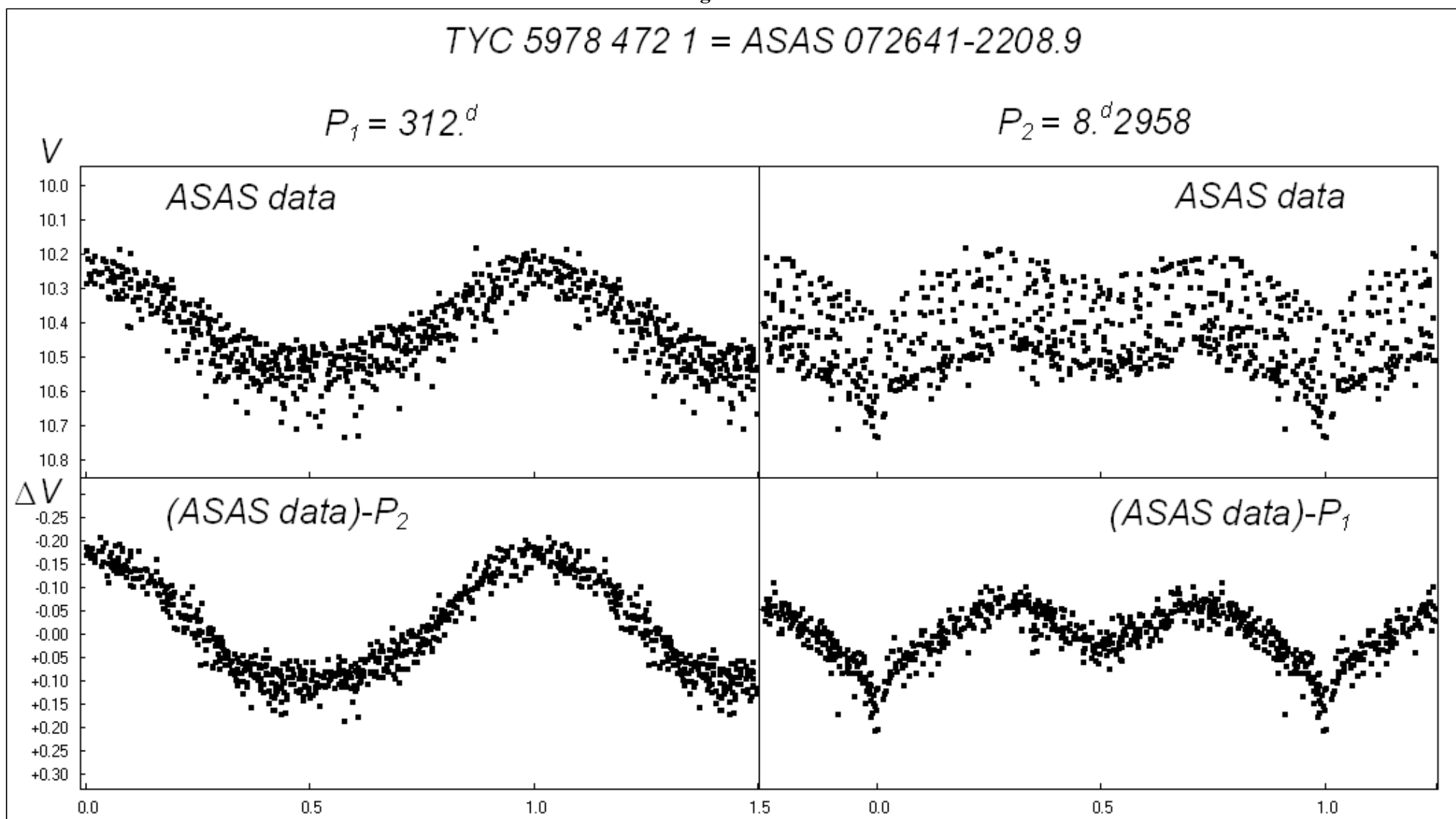
The tabulated coordinates are from the Tycho-2 catalog.

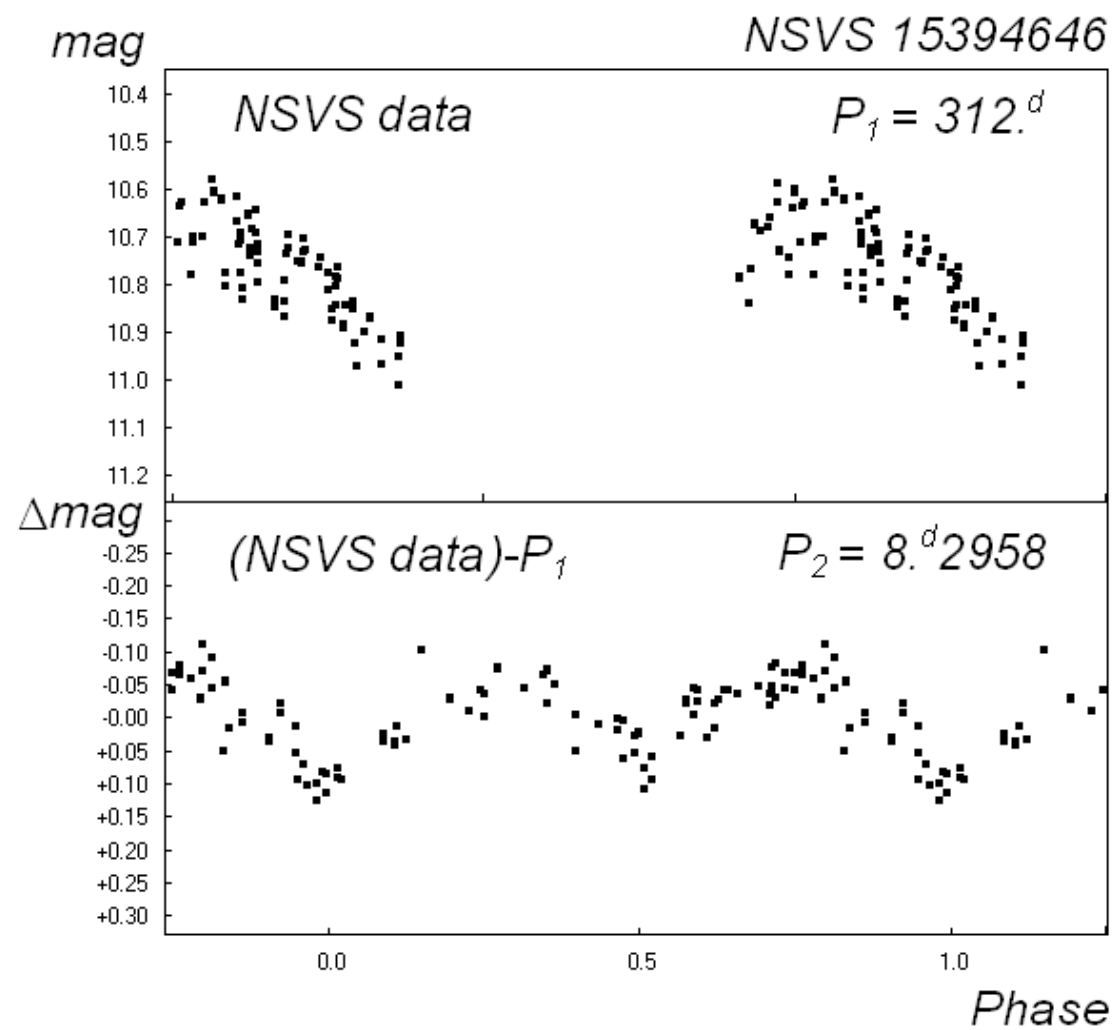
References:

Pojmanski, G., 2002, Acta Astronomica, 52, 397

Wozniak, P.R., Vestrand, W.T., Akerlof, C.W., et al., 2004, Astron. J., 127, 2436

Light Curve





The phased light curves. ASAS-3 data, top: folded with the periods P_1 and P_2 ; Bottom: the same curves after prewhitening the other variation. NSVS data are shown after the ASAS data; top: the raw data folded with the period P_1 ; bottom: the data, with the period P_1 prewhitened, folded with the period P_2 .