V2198 Sgr, a New Double-Mode RR Lyrae Variable Star

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Star Name:	V2198 Sgr, GSC 7942-00725, ASAS 195123–4125.7, 1SWASP J195122.92–412551.9
Coordinates (J2000):	19 51 22.91, –41 25 51.6
Variability type:	RR(B); **Limits, System:** 14.0 – 14.7 (V);
Period:	(see Remarks) d; **Epoch(max):** JD (see Remarks)

Remarks:

The variability of V2198 Sgr was discovered by Hoffmeister (1963), who classified it as an RR Lyrae star but did not suggest any light elements. The star does not enter the ASAS catalog of variable stars.

I analyzed all available observations of V2198 Sgr from the ASAS-3 (Pojmanski 2002) and SuperWASP (Butters et al. 2010) online public archives. The ASAS-3 data permitted an analysis for double-mode behavior. The results were then confirmed using SuperWASP data, a total of 22495 observations. The WASP data from different time intervals exhibit considerable differences of the mean brightness, so that we had to consider two time intervals separately: 2453860–2454014 and 2454211–2454614 . In the figure, the results for the second subset (2454211–2454614) are displayed, the first one (2453860–2454014) gives similar results.

The observations were analyzed using the period-search software developed by Dr. V.P. Goranskij for Windows environment. The WASP observations, available as FITS tables, were converted into ASCII tables using the OMC2ASCII program as described by Sokolovsky (2007).

According to our analysis, V2198 Sgr is an RR(B) star. The period ratio $P_1/P_0 = 0.7463$ is typical of RR(B) stars (fundamental mode and first overtone mode). The amplitude of the first overtone mode exceeds that of the fundamental mode. The phased light curves are plotted for the elements collected in the table below.

V2198 Sgr = ASAS 195123–4125.7 = 1SWASP J195122.92–412551.9

Mode	Frequency, c/d	Semi-amplitude, mag	Period, days	Epoch, JD
f_0	1.80809	0.100 (V); 0.092 (WASPmag)	0.55307	2454297.412
f_1	2.42266	0.150 (V); 0.268 (WASPmag)	0.41277	2454297.425
$f_1 + f_0$	4.2308	0.048 (WASPmag)	0.23636	2454297.402
$f_1 - f_0$	0.6146	0.033 (WASPmag)	1.627	2454297.295

Also identified are the periods corresponding to the interaction frequencies f_0+f_1 and f_1-f_0.

J–H = 0.136 (2MASS).

References:

Butters, O.W., West, R.G., Anderson, D.R., et al., 2010, Astron. and Astrophys., 520, L10
Hoffmeister, C., 1963, Veröff. Sternwarte Sonn., 6, 1
Pojmanski, G., 2002, Acta Astronomica, 52, 397
Sokolovsky, K.V., 2007, PZP, 7, 30

Light Curve

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$P_0 = 0.^d55307$ $P_1 = 0.^d41277$