GEOS
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GEOS CIRCULAR ON RR LYR TYPE VARIABLES

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NSV 4219 UMa : AN RR LYR VARIABLE OF THE RRAB TYPE

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SUMMARY

NSV 4219 UMa is catalogued as a rapid variable, with photographic magnitudes ranging from 11.1 to 11.9, in the New Catalogue of Suspected Variable Stars (1982), after a paper by E. Geyer et al. (1955). Visual estimates and photoelectric measurements show that it is an RR Lyr star of the RRab type, with the following elements :

(2) JD hel 49012.9896 + 0.5428316 d x E

Its magnitude varies from 10.89 to 11.38 in V, with a B–V colour index from 0.39 to 0.61 in the Johnson and Morgan system. M–m = 0.24 period.

RESUME

NSV 4219 UMa est cataloguée variable rapide de magnitude 11.1 à 11.9 (p) dans le New Catalogue of Suspected Variable Stars (1982), d'après un article de E. Geyer et al. (1955). Nos estimations visuelles et nos mesures photoélectriques montrent que c'est une étoile du type RRab, dont les éléments correspondent à la formule suivante :

(2) JJ hél 49012.9896 + 0.5428316 j x E

Sa magnitude varie de 10.89 à 11.38 en V, avec un indice de couleur B–V allant de 0.39 à 0.61 dans le système de Johnson et Morgan. M–m = 0.24 période.

RIASSUNTO

NSV 4219 UMa è classificata come variabile rapida, con magnitudine fotografica che va da 11.1 a 11.9, nel New Catalogue of Suspected Variable Stars (1982) a seguito di une articolo di E. Geyer et al. (1955). Stime visuali e misure fotoelettriche da noi eseguite mostrano che si tratta di una stella del tipo RRab, i cui elementi corrispondono alla seguente formula :

(2) JJ el 49012.9896 + 0.5428316 j x E

La sua magnitudine varia da 10.89 a 11.38 nel V, con un indice di colore B–V che va da 0.39 a 0.61 nel sistema di Johnson e Morgan. M–m = 0.24 periodo.

RESUMEN

NSV 4219 UMa está catalogada como variable rápida, de 11.1 a 11.9 (p) en el New Catalogue of Suspected Variable Stars (1982), basándose en un artículo de E. Geyer et al. (1955). Nuestras estimaciones visuales y nuestras medidas fotoeléctricas muestran que es una estrella de tipo RRab, cuyos elementos corresponden a la fórmula :

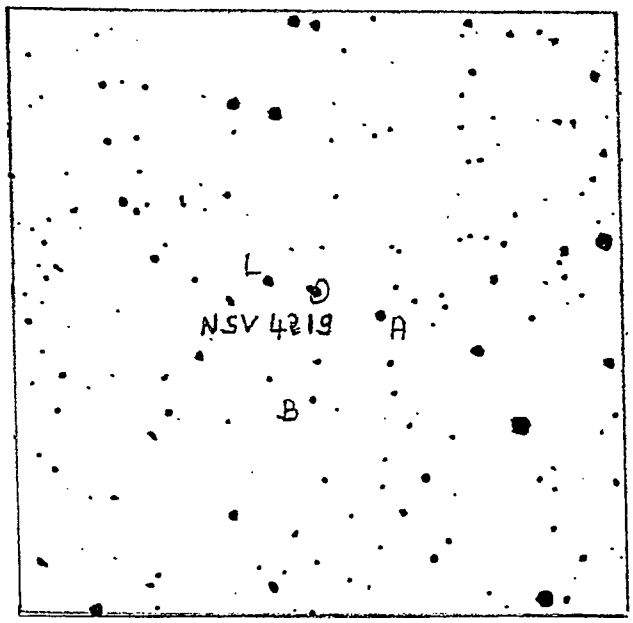
(2) DJ hel 49012.9896 + 0.5428316 d x E

Su magnitud varía de 10.89 a 11.38 en V, con un índice (B–V) variable de 0.39 a 0.61. M–m = 0.24 periodo.

1. INTRODUCTION

NSV 4219 UMa = CSV 6652 = BV 28
α = 08h 45min 12s δ = +56° 36.6' (2000)

fig 1 : chart of NSV 4219 UMa and its comparison stars



"Stellarum"

The variability of NSV 4219 UMa was discovered by W. Strohmeier (E. Geyer et al., 1955) when he compared photographic plates taken at the Bamberg Observatory between 1929 and 1930. The magnitude changes were noted to be rapid and ranging between 11.1 and 11.9 (p).

It is a visual double star. Its companion is of magnitude 12.61 (V) with a B−V of 0.53.

2. OBSERVATIONS (visual estimates and photoelectric measurements)

I introduced NSV 4219 UMa in my visual observing programme in February 1991. To date, I have lugged 490 estimates of the star including 20 instants of maxima, while Mino Benucci observed it during one maximum.

The first photoelectric measurements were obtained during a GEOS mission at the Jungfraujoch station, at the end of 1992. Others were obtained subsequently and I have now 47 measurements at my disposal made with the photometer attached to the Jungfraujoch Observatory 76-cm telescope equipped with the B and V filters of the Geneva photometric system. It covers most of the star's cycle with an instant of maximum.

3. STUDY OF THE STAR'S PERIOD AND TYPE

The variability of NSV 4219 UMa was confirmed with the six photoelectric measurements of December 1992. I had the opportunity to perform a good survey of my first visual maximum at

the end of January 1993 and, subsequently, a PDM analysis of my estimates showed an obvious period of about 0.54 day with the lightcurve of an RR Lyr star (GEOS NC 709, 1993). In that paper, I published the first ephemeris of NSV 4219 UMa, which was calculated with the first six instants of maxima I could obtain from my estimates :

(1) JD hel 49013.008 + 0.54261 d x E
± 0.015 ± 0.00039 (confidence 95%)

To date, I have one photoelectric maximum and 21 maxima determined from visual estimates at my disposal.

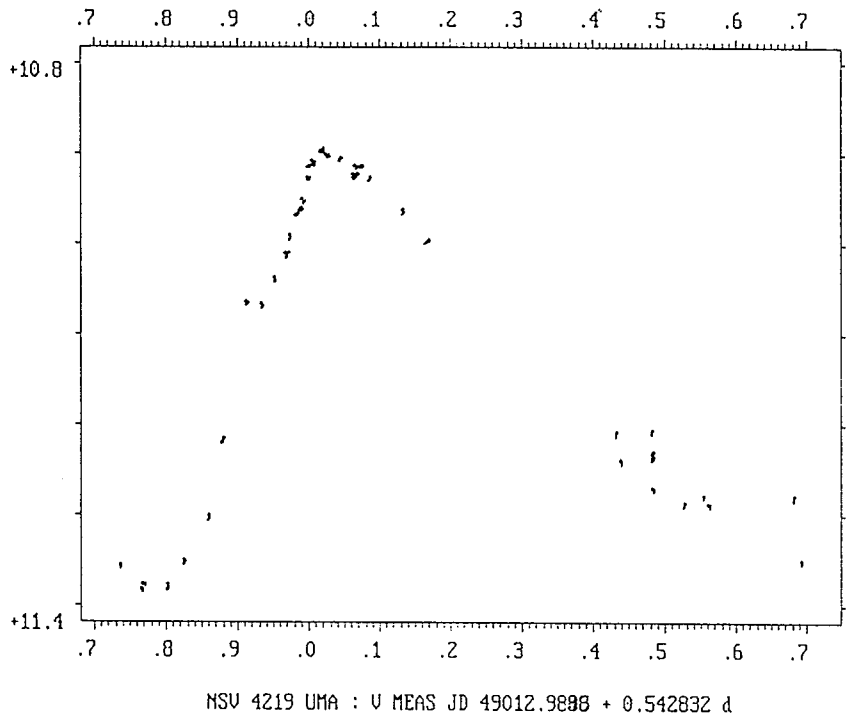
table 1 : list of the instants of maximum light obtained from visual estimates by Mino Benucci (BEN), the author (VBR) and from photoelectric measurements in V (JUV)

OBSERVERS	JD HEL (2400000 +)	E	O – C (2)
VBR	49013.5531	1	+ 0.0207
VBR	49031.4457	34	– 0.0002
VBR	49055.3411	78	+ 0.0106
VBR	49061.3011	89	– 0.0005
VBR	49062.3982	91	+ 0.0109
VBR	49075.3952	115	– 0.0200
VBR	49113.4083	185	– 0.0051
VBR	49329.4548	583	– 0.0056
VBR	49392.4347	699	+ 0.0058
VBR	49404.3648	721	– 0.0064
VBR	49425.5262	760	– 0.0154
VBR	49442.3534	791	– 0.0160
BEN	49449.4383	804	+ 0.0121
VBR	49461.3749	826	+ 0.0064
VBR	49474.3822	850	– 0.0142
VBR	49475.4710	852	– 0.0111
JUV (x 3)	49722.4801	1307	+ 0.0096
VBR	49778.3936	1410	+ 0.0115
VBR	49780.5518	1414	– 0.0016
VBR	49787.6069	1427	– 0.0037
VBR	49798.4534	1447	– 0.0135
VBR	49830.4996	1506	+ 0.0056

Giving a triple weight to the photoelectric moment, I used all the instants above to calculate the elements of the period of NSV 4219 UMa by linear regression and obtained the following ephemeris :

(2) JD hel 49012.9896 + 0.5428316 d x E
± 0.0048 ± 0.0000093 (confidence 95%)

fig 2 : composite light curve of the 47 photoelectric measurements in V of NSV 4219 UMa using ephemeris (2)

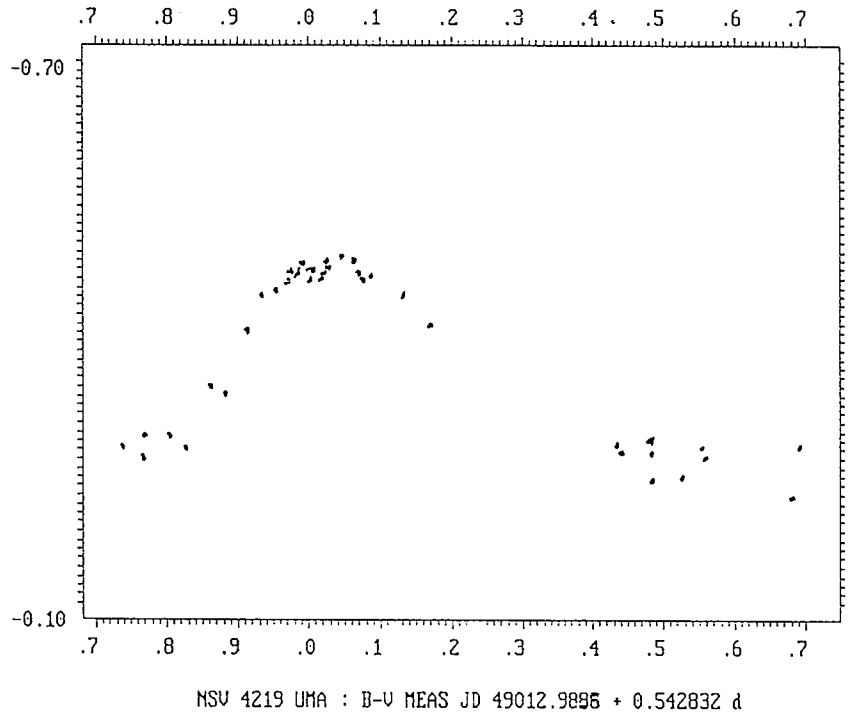


These measurements were obtained with the Jungfraujoch telescope during the following nights : JD 48983 (4 measurements), 48984 (2 measurements), 49097 (2 measurements), 49721 (3 measurements) and 49722 (36 measurements).

Except when in the vicinity of the minimum, all the measurements between phase 0.7 and phase 0.2 were obtained during the same cycle of the variable. The accuracy is ± 0.03 magnitude in V and the non-alignment of the point at phase 0.91 is not necessarily an actual change in the rate of light growth. The fluctuations at the end of the decreasing phase are probably actual because they are typical of the light curve of RR Lyr stars with periods very close to that of NSV 4219 UMa (J. Lub, 1977).

The ascending phase (M-m) is 0.24 period, which indicates an RRab Lyr star.

fig 3 : composite light curve of the 47 photoelectric indices (B−V)G of NSV 4219 UMa using ephemeris (2)



The (B−V)G indices of NSV 4219 UMa range from − 0.49 to − 0.22 (or from 0.39 to 0.61 in the Johnson and Morgan system). They are in agreement with the F spectrum of the New Catalogue of Suspected Variable Stars (1982). The shape of the indices curve clearly shows that NSV 4219 UMa is a classical pulsating star of the RR Lyr type.

4. CONCLUSION

NSV 4219 UMa (08h 45min 12s + 56° 36.6') (2000) is an RR Lyr star of the RRab type pulsating according to ephemeris (2) JD hel 49012.9896 + 0.5428316 d x E. Its magnitude goes from 10.89 to 11.38 (V) with a colour index (B−V)J going from 0.39 to 0.61. M−m = 0.24 period.

5. BIBLIOGRAPHY

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