

A NEW PERIOD FOR AX UMA

(Received 1985 January 14; accepted 1985 April 05)

ABSTRACT. A NEW PERIOD FOR AX UMA .

In 1958, G. Romano photographically discovered AX UMa. He proposed a first ephemeris (1) for this RRab-type variable, in 1964. During three seasons, ten maxima were recorded by three GEOS visual observers. The reduction of the observations clearly shows that the period found by G. Romano is no longer valid.

The new elements proposed by this paper are as follows :

$$\begin{aligned} \text{Max} = \text{Hel. J. D. } 2\,445\,382.559 &+ 0.534\,91 \text{ E} && (2) \\ &\pm .006 \quad \pm .000\,01 \end{aligned}$$

(95% confidence interval for the error bands) .

RESUME. UNE NOUVELLE PERIODE POUR AX UMA .

A partir d'observations photographiques, G. Romano découvrit, en 1958, la variable de type RRab AX UMa et proposa une éphéméride (1) en 1964. Durant trois saisons, dix maxima ont été suivis visuellement par trois observateurs du GEOS. La réduction des observations montre clairement que la période trouvée par G. Romano n'est plus correcte.

Les nouveaux éléments proposés sont les suivants :

$$\begin{aligned} \text{Max} = \text{J. J. hél. } 2\,445\,382.559 &+ 0.534\,91 \text{ E} && (2) \\ &\pm .006 \quad \pm .000\,01 \end{aligned}$$

(les bandes d'erreur sont données au niveau de confiance 95%) .

RIASSUNTO. UN NUOVO PERIODO PER AX UMA .

Nel 1958 G. Romano scoprì fotograficamente la variabilità di AX UMa e nel 1964 propose la prima effemeride (1) per questa RRab. Dieci nuovi tempi di massimo sono stati ottenuti in tre stagioni da tre osservatori visuali GEOS. La riduzione di questi dati mostra chiaramente che il periodo trovato da G. Romano non è più valido.

I nuovi elementi proposti sono i seguenti :

$$\begin{aligned} \text{Max} = \text{G. G. elioc. } 2\,445\,382.559 &+ 0.534\,91 \text{ E} && (2) \\ &\pm .006 \quad \pm .000\,01 \end{aligned}$$

dove le barre d'errore sono state calcolate al livello di confidenza del 95%.

RESUMEN. UN NUEVO PERIODO PARA AX UMA .

AX UMa es una variable de tipo RRab, que fué descubierta por G. Romano en 1958 a partir de observaciones fotográficas, proponiendo, en 1964, una efemeride (1). Durante tres temporadas, diez máximos han sido seguidos visualmente por tres observadores del GEOS. La reducción de las observaciones muestra claramente que el periodo propuesto por G. Romano es erróneo.

Los nuevos elementos propuestos son los siguientes :

$$\begin{aligned} \text{Máx} = \text{D. J. Hel. } 2\,445\,382.559 &+ 0.534\,91 \text{ E} && (2) \\ &\pm .006 \quad \pm .000\,01 \end{aligned}$$

(las bandas de error vienen dadas con un nivel de confianza del 95%) .

I) INTRODUCTION

AX UMa was photographically discovered in 1958 by G.Romano, who suspected it to be an RRab star. In 1964, the Italian astronomer confirmed his discovery, setting the photographic amplitude to I2.2 - I3.6 and proposing the following ephemeris, later to be published in the General Catalogue of Variable Stars (1969).

$$\text{Max: Hel. J.D. } 2435951.354 + 0.53510 \text{ E} \quad (I)$$

II) OBSERVATIONS

During three seasons (1982 to 1984), three Belgian GEOS observers confirmed the star to be an RRab. Ten maxima were observed visually, using a 300 mm reflector.

It is noteworthy that the chart published by Romano is not correct as far as the position of the variable star is concerned, we therefore prefer the one shown below (see Figure I), where the magnitudes used for the comparison stars are the result of mean visual estimations made over the three seasons.

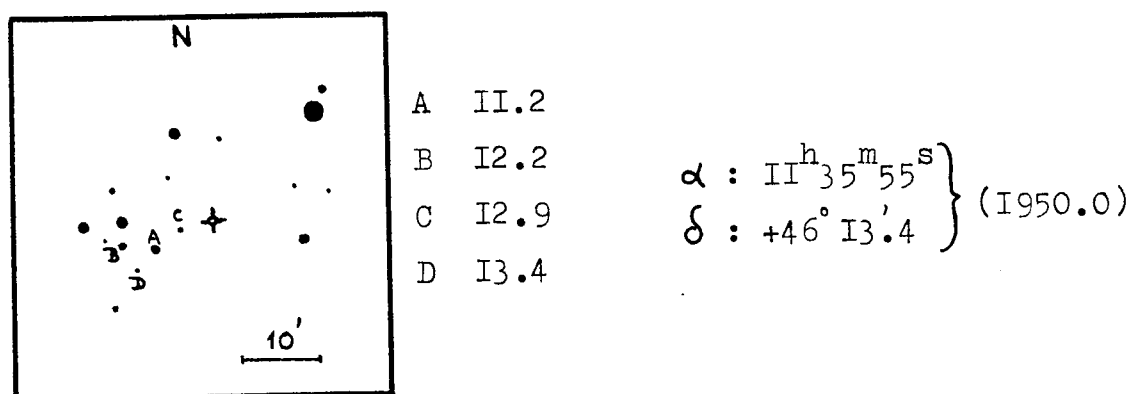


Figure I: AX UMa and its comparison stars.

III) RESULTS

The ten maxima observed are listed in Table I with the name of the observer, the number of estimates used, the number of cycles according to ephemeris (2), the O-C values according to ephemerides (1) and (2).

The analysis of the data clearly shows that Romano's ephemeris (I) is no longer valid. After reduction of the observed values described in this paper, we propose the following elements:

$$\text{Max: Hel. J.D. } 2445382.559 \pm 6 + 0.53491 \pm 1 \text{ E } (2)$$

(95% confidence interval for the error bands)

Hel. J.D. 2400000 +	Observer	n	E	O-C (I)	O-C (2)
45074.440	BONINSEGNA R.	15	- 576	+0.166	-0.010
45074.454	LEYMAN R.	16	- 576	+0.180	+0.004
45075.522	LOUIS P.	12	- 574	+0.178	+0.002
45075.523	BONINSEGNA R.	18	- 574	+0.179	+0.003
45382.563	"	16	0	+0.072	+0.004
45402.355	"	8	37	+0.065	+0.004
45406.622	"	27	45	+0.051	-0.008
45698.689	"	16	591	-0.047	-0.003
45809.409	"	9	798	-0.092	-0.010
45818.524	"	11	815	-0.074	+0.012

Table I: List of the maxima of AX UMa visually observed.

A mean light curve, based on ephemeris (2), was plotted using 177 estimates from R. BONINSEGNA (see figure II). All data were averaged on intervals of 0.05 period. The 20 mean points are listed in Table II. From that curve, we can consider that AX UMa varies from 12.6 to 13.9 v.

ψ	n	m	ψ	n	m	ψ	n	m
0.03	30	12.78	0.38	3	13.72	0.68	5	13.75
0.07	18	13.03	0.41	3	13.69	0.72	6	13.87
0.12	5	13.21	0.47	2	13.79	0.78	5	13.81
0.18	4	13.27	0.53	6	13.75	0.82	8	13.82
0.22	3	13.35	0.57	7	13.86	0.88	12	13.65
0.27	2	13.59	0.63	4	13.92	0.93	20	13.24
0.33	3	13.66				0.98	31	12.66

Table II: Phase (ψ), number of estimates used (n) and magnitude of each point of the mean light curve of AX UMa.

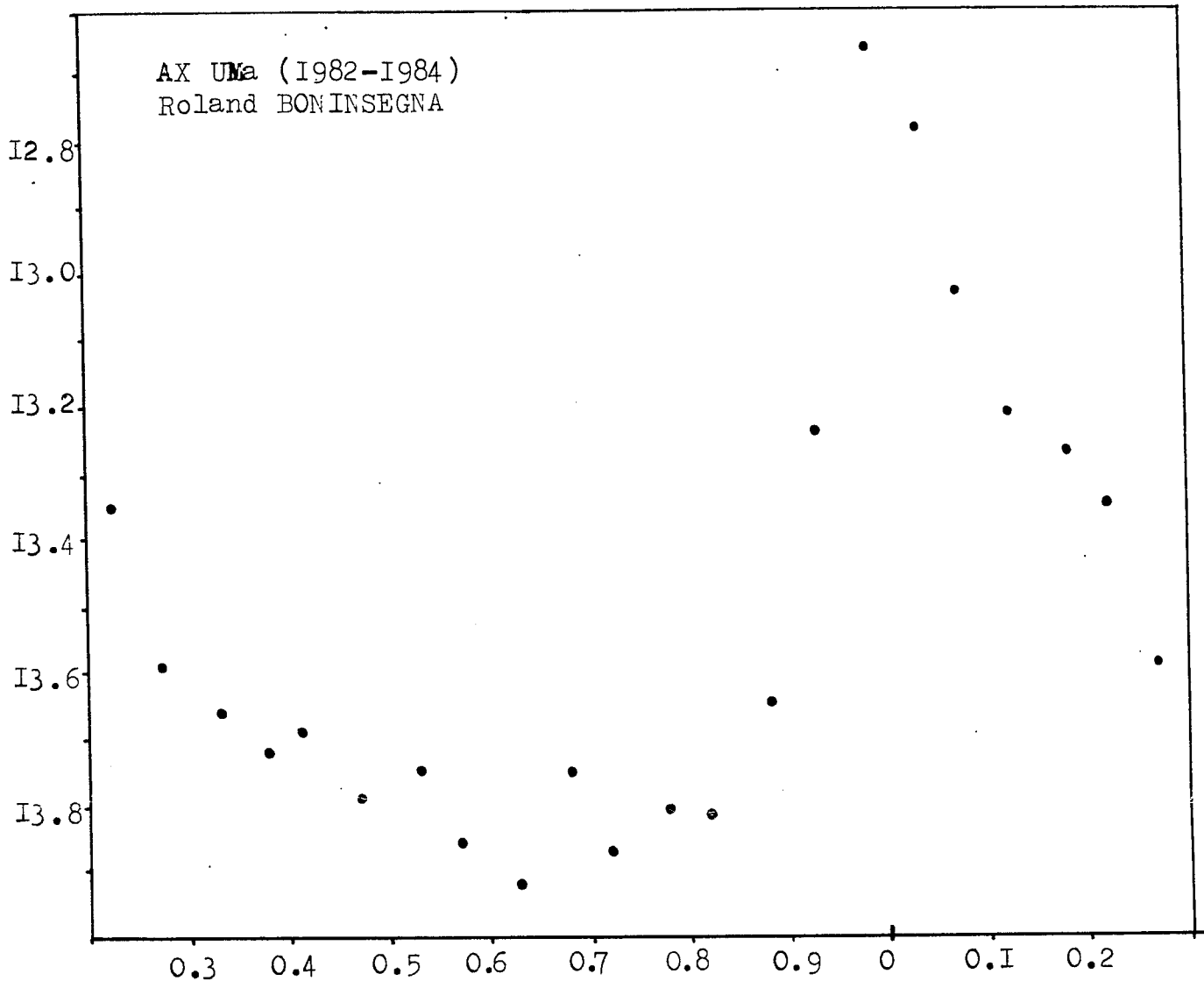


Figure II: Mean light curve of AX UMa, using I77 visual estimates from one observer, based on ephemeris (2).

IV) CONCLUSION

The period of AX UMa as announced in the General Catalogue of Variable Stars is no longer valid. This circular gives new elements from ten visual maxima observed along three seasons.

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