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PHOTOMETRIC AND POLARIMETRIC OBSERVATIONS OF MIRAS

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As a part of joint investigations on long period variables within the framework of the French–Armenian Jumelage in astronomy, the preliminary results of photometric and polarimetric observations of nine Miras are presented in this paper.

The observations have been carried out with the photopolarimeter attached to the AZT-14 50cm telescope of the Byurakan Observatory in the B, V, R bands. Nine long-period variables were observed from January to September 1997. The photopolarimeter works in the regime of amplification of the direct current and can serve as a photoelectric photometer when the polaroid is removed. A photomultiplier FEU 79 was used with a maximum of sensitivity in the spectral region 4000–4400 Å. A comparison star and a background star have been measured for with every programme star. The accuracy of the photoelectric observations in the BVR bands is about $0\overset{m}{.}02 - 0\overset{m}{.}05$. The uncertainties of the polarimetric measurements are of the order of 0.2%–0.3%. The position of the angle of polarization is determined with an accuracy of 2°–4°. A detailed description of the observational method and the instruments has already been published (Eritsian and Nersisian 1984).

Table 1 gives the B, V, R magnitudes in the Johnson system for six observed Mira stars. In three other cases (R Aql, RT Cyg and R Aqr) a polarization has been detected, as shown in Table 2, which gives in addition to the photometric magnitudes the degree of polarization in the B, V, R bands and the polarization angle. This polarization proved variable. Moreover the wavelength dependence and the absence of polarization of the nearby background stars demonstrate the intrinsic character of the light polarization.

The main result of the investigation is the detection of rapid variations on R Gem and R Boo, as shown in Figures 1 and 2. Similar rapid variations have already been detected on Y Ori (Melikian and Jakubov 1995) and on T Cep (Magnan et al. 1996).

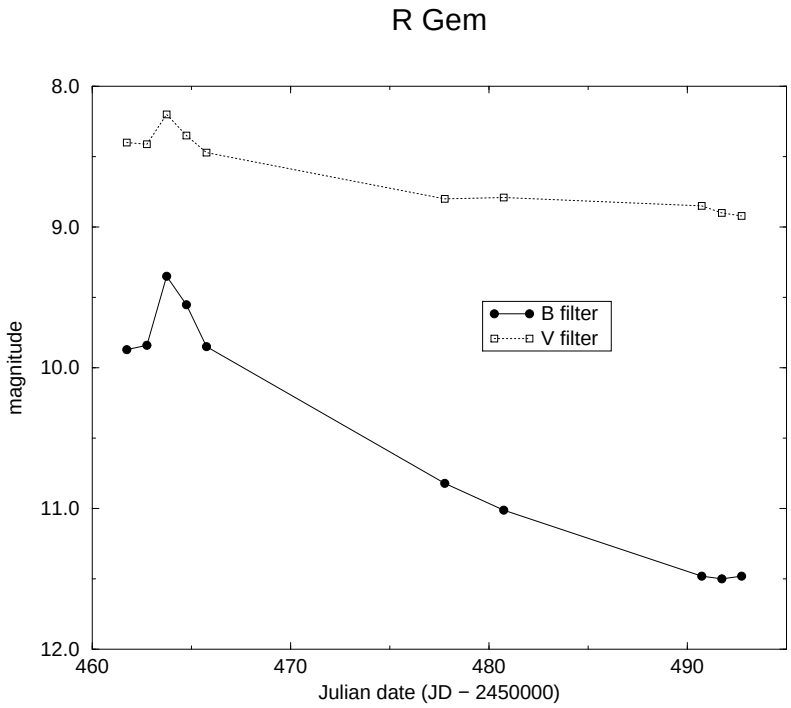

Figure 1. Rapid variation of R Gem

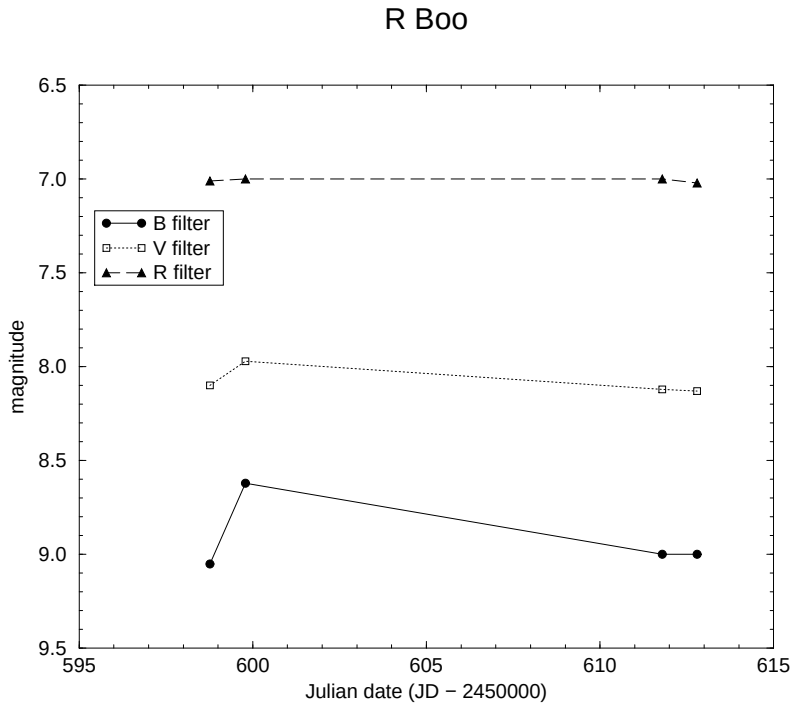

Figure 2. Rapid variation of R Boo

Table 1: Photometry of some Mira stars

Star	Julian Date (JD−2450000)	m_B	m_V	m_R
R Gem	461.243	9.87	8.40	-
	462.264	9.84	8.41	-
	463.250	9.35	8.20	-
	464.257	9.55	8.35	-
	465.271	9.85	8.47	-
	477.264	10.82	8.80	-
	480.250	11.01	8.79	-
	490.229	11.48	8.85	-
	491.229	11.50	8.90	-
	492.229	11.48	8.92	-
S Ori	462.333	9.28	9.03	-
	463.312	9.28	8.91	-
	464.312	9.22	8.78	-
	465.323	9.20	8.67	-
	477.312	9.07	8.65	-
	480.306	9.00	8.45	-
R Aur	476.236	9.18	7.33	-
	477.361	9.19	7.31	-
U Cam	490.285	10.74	8.64	-
	491.271	10.76	8.60	-
	492.278	10.74	8.62	-
R Boo	598.271	9.05	8.10	7.01
	599.285	8.62	7.97	7.00
	611.292	9.00	8.12	7.00
	612.299	9.00	8.13	7.02
X Oph	611.333	9.50	8.62	7.05
	612.337	9.47	8.57	7.05
	613.333	9.52	8.60	7.05

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Table 2: Photometry and polarimetry of 3 Mira stars

Star	Julian Date	m			P(%)			$\theta(°)$		
	(JD−2450000)	B	V	R	B	V	R	B	V	R
R Aql	602.292	10.90	9.70	7.40	-	0.8	1.0	-	38	40
	603.288	10.92	9.75	7.48	-	0.8	1.0	-	38	40
	604.271	10.92	9.71	7.40	0.7	0.8	1.0	35	40	40
	605.267	10.88	9.70	7.46	-	0.9	1.2	-	38	42
	687.271	8.60	7.90	6.30	1.5	1.8	1.5	44	42	40
	688.267	8.60	7.80	6.10	2.0	1.4	0.6	40	42	40
	690.292	8.55	7.80	6.27	1.6	1.4	-	48	40	-
	693.250	8.41	7.72	6.22	1.9	1.6	-	50	40	-
RT Cyg	658.243	7.72	7.08	-	-	-	-	-	-	-
	662.243	7.70	7.10	-	-	-	-	-	-	-
	685.243	9.27	7.74	-	1.1	1.1	1.8	40	45	45
	686.236	9.28	7.70	-	2.3	2.6	3.0	38	40	45
	687.243	9.36	7.72	-	1.1	1.2	1.2	40	42	50
	691.250	9.62	7.78	-	1.1	1.0	0.6	40	45	48
R Aqr	640.417	-	-	-	-	-	0.9	-	-	40
	671.250	9.86	8.60	-	4.1	3.0	1.8	45	38	40
	673.250	10.30	9.10	-	3.8	2.8	2.5	35	40	45
	690.292	10.81	10.13	-	5.7	3.0	2.5	42	37	45
	693.333	10.95	10.12	-	-	5.0	1.3	-	42	44

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