Long-term Photometric Monitoring of Binary Systems with Black Hole Components

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Abstract

In this study, we present long-term VRI monitoring of some selected X-ray binaries with black hole components. New observations obtained by using the 60cm Robotic telescope at the TÜBİTAK National Observatory (TUG). We aim to investigate long-term photometric variations of X-ray binaries with black hole component. Preliminary multicolor photometric behavior of the system V518 Per, V616 Mon, V479 Sct, and V1343 Aql are presented in this poster.

Introduction

X-ray binary systems can be divided into three classes as LMXB, IMXB, and HMXB; based on their observational features. According to this classification an X-ray binary with a low-mass, late-type component is classified as LMXB. The existences of active late-type stars in these systems show themselves in their long-term light variations. The number of known IMXB systems, with intermediate mass stellar components, is relatively low. Podsiadlowski, Rappaport, and Pfahl (2001) presented an evolutionary study of the LMXBs and IMXBs. HMXBs contain 0-B type highly massive stars that loose mass via hot stellar winds. In addition to the stellar winds, active regions on the stellar surface and the oblate shape of the component can play important roles in the light variation of a system. Long-term light variations of these kinds of systems have been studied in the literature by (e.g. Clark et al., 1999, Goranskij, 2011; Sazanov, 2009, Reig and Fabregat, 2015).

New Observations

Selected systems were observed in V, R, and I bands over 85 nights between February-May 2015. The new observations were carried out at the TÜBİTAK National Observatory (TUG) with the 60cm robotic telescope (T60). T60 was equipped with a FLI CCD with 2048X2048 pixel. The frame reduction performed by subtracting the bias and dark frames and finally dividing by flat-field frames. During the reduction processes, we have studied all the nights and each frame separately. Comparison stars were selected to be the same as observed in the earlier studies in the literature. A total of 44, 24, 84, and 54 data points were obtained for V518 Per, V616 Mon, V479 Sct, and V1343 Aql; respectively. The observations journal is summarized in Table 1. In Fig. 1 we show the *VRI* light curves of V479 Sct and V1343 Aql.

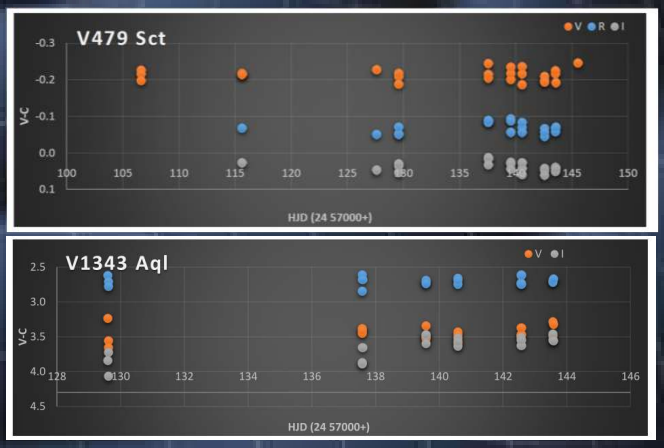

Figure 1. V, R, and I observations of V1343 Aql and V479 Sct.

Table 1. Observational properties of the selected systems.

System	Alias	α	δ	V	P(day)	Observation date	Filter	N
V518 Per	GRO J0422+32	04 21 42.8	+32 54 26.7	13.2	0.213	57059-57089	VRI	44
V616 Mon	A0620-00	06 22 44.5	-00 20 44.7	11.2	0.327	57059-57088	VR	24
V479 Sct	RX J1826.2-1450	18:26:15.1	-14 50 54.3	11.23	4.427	57116-57159	VRI	84
V1343 Aql	SS 433	19:11: 49.6	+04 58 57.9	13.0	13.086	57129-57144	VRI	54

Summary and Future Plans

In this observational project, all X-ray binary systems with black-hole components have been handled and selected those that are convenient for TUG limits. Observations started on February 2015 and the light variations of the selected systems are planned to follow with this telescope. Four of these systems, which have been observed during this observation season, have been analyzed. In this project, it has been aimed to study the long-term light variation analysis of the selected systems with a black hole component. The preliminary results of the selected four systems are presented in Fig. 1. The results then will be combined with the future observations and with those that were published in the literature and will be analyzed to study the long-term light variations of the systems.

References

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