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PHOTOGRAPHIC B, V PHOTOMETRY OF Sco X-1

77 blue and 72 yellow, mostly simultaneous exposures were made with the 20-20 inch Yale-Columbia double astrograph at El Leoncito, San Juan, Argentina, of Sco X-1.

The blue exposures, on Kodak 103 a0 emulsion, were made without the usual filter normally used to eliminate undesirable ultraviolet from the Johnson B band. However, we may be sure that most of this light was absorbed by the four glass components of the Ross-objective lens system. The yellow observations, on Kodak 103 aD, were all made through a Schott GG14 filter.

In addition to these south American observations, we obtained 71 blue exposures of Sco X-1 during the same period, with the Yale 40 inch Ritchey-Chretien reflector at Bethany, Connecticut, U.S.A. This series, on Kodak 103 a0 emulsion, used a Schott GG13 filter to eliminate undesirable ultraviolet light from the Johnson B band.

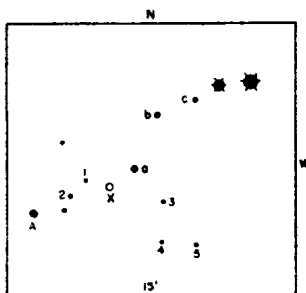
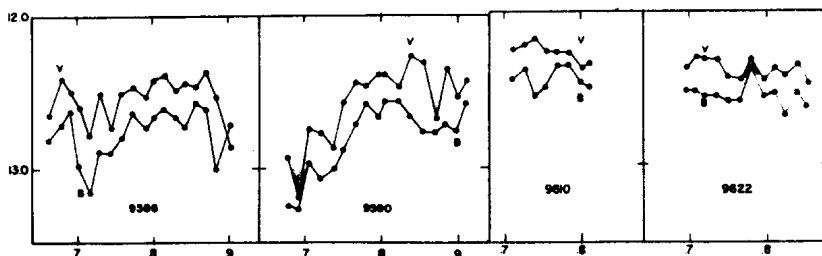


Figure 1. Field of Sco X-1 with comparison stars.

Figure 1 shows Sco X-1 and its surroundings. The two bright stars are BD-15°4300 and -15°4301. The stars 1, 2, ... 5 were measured by A. Sandage et. al. The stars A, a, b and c were used as comparison stars for the present photometry. The U, B, V photometry of these was done by Dr. R. McClure at our request, at the Interamerican Observatory at Tololo. Table 1 gives the U, B, V results as obtained by McClure and Sandage et. al.

Sco X-1 and the comparison stars A, a, b and c were measured on all the available plates with the Yale iris photometer. In the reduction of the blue exposures we used the colour equation $B' = B + 0.05 (B-V)$ whereas the yellow exposures were reduced without a colour equation on V. For each exposure a separate reduction curve was used. The individual South American and North American results are given in Table 2 and Table 3 respectively. Although the northern and southern observations cover approximately the same period, there is only one night (243 9610) with data from both hemispheres. The two series agree within the observational error. The standard error of a single apparent magnitude as given in Tables 2 and 3 is ± 0.06 . Only the South American observations from nights with more than 7 exposures have been represented graphically (Figures 2 and 3).



Figures 2 and 3. Brightness of Sco X-1 in both B and V.

It is seen that the brightness varies considerably during a single night, whilst there is no evidence of periodicity. There is a marginal indication from all observations that the star is slightly bluer when bright. The mean colour index, using all the data, is found to be $B-V = + 0.20 \pm 0.01$ in good accord with the photoelectric measures by Sandage et. al.

We are indebted to Dr. R.D. McClure for his U, B, V photometry of the comparison stars. We thank Mr J. Stordy for the Bethany plates. We gratefully acknowledge the assistance from Mrs. K. DeVorkin with the measurements and the reduction. The work was partly supported by a grant from the NSF.

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Reference:

A. Sandage et. al., Ap.J. 146, 316 (1966).

Table 1

Star	V	B-V	U-B
-15 ^o 4300	8.5	+0.25	+0.22
15 4301	9.88	+0.33	+0.27
1	14.97	+0.94	+0.41
2	16.25	+1.05	+0.43
3	14.17	+1.16	+0.87
4	14.47	+0.84	+0.33
5	14.46	+0.83	+0.26
A	11.34	+0.69	+0.15
a	11.49	+1.32	+1.23
b	12.37	+0.84	+0.35
c	13.36	+0.77	+0.24

Table 2 El Leoncito, San Juan, Argentina

J.D. hel.			J.D. hel.		
2430000+	B	V	2430000+	B	V
9527.846	13.16	-	9590.838	12.68	12.27
9527.846	13.28	-	90.856	12.78	12.32
9538.867	12.63	-	90.869	12.79	12.70
9557.827	13.42	-	90.883	12.73	12.36
9538.868	12.49	-	90.897	12.78	12.55
9555.827	12.72	-	90.911	12.60	12.44
9556.859	12.60	-	9591.829	12.32	-
9557.842	13.16	-	91.843	12.32	-
9567.794	12.89	-	91.856	12.30	-
9586.662	12.83	12.68	91.870	12.28	-
86.676	12.73	12.41	91.884	12.40	-
86.690	12.64	12.51	9610.712	12.44	12.26
86.704	13.00	12.61	10.726	12.38	12.21
86.717	13.18	12.80	10.740	12.56	12.19
86.731	12.91	12.52	10.754	12.49	12.26
86.745	12.91	12.75	10.771	12.36	12.28
86.759	12.81	12.51	10.785	12.35	12.28
86.773	12.67	12.49	10.799	12.47	12.38
86.787	12.76	12.54	10.812	12.49	12.33
86.800	12.68	12.42	9616.864	12.76	-
86.814	12.62	12.40	16.880	12.81	-
86.829	12.68	12.50	16.897	12.59	-
86.842	12.74	12.45	16.914	12.65	-
86.856	12.58	12.48	9617.856	12.93	12.70
86.870	12.63	12.39	17.873	13.02	12.76
86.884	13.03	12.55	17.891	12.91	12.76
86.904	12.72	12.89	17.908	13.08	12.89
9590.679	13.27	12.94	9620.869	-	12.42
90.693	13.29	13.21	20.882	-	12.37
90.707	12.99	12.76	20.896	-	12.28
90.720	13.09	12.79	20.910	-	12.27
90.738	13.03	12.89	9622.694	12.52	12.38
90.752	12.90	12.59	22.707	12.52	12.30
90.766	12.73	12.45	22.721	12.56	12.31
90.779	12.60	12.49	22.735	12.56	12.31
90.797	12.68	12.40	22.752	12.59	12.43
90.804	12.59	12.40	22.766	12.59	12.45
90.824	12.59	12.49	22.780	12.38	12.31
			22.794	12.56	12.45
			22.811	12.52	12.39
			22.825	12.69	12.41
			22.839	12.52	12.35
			22.853	12.62	12.47

Table 3 Bethany, Connecticut, U.S.A.

J.D. hel.	B	J.D. hel.	B
2430000+		2430000+	
9584.891	12.64	9641.750	13.24
9589.849	13.53	41.755	13.23
9592.850	12.45	41.761	13.46;
9593.813	13.06	41.766	13.08
9609.772	12.27	9642.726	13.02
09.791	12.23	42.732	13.11
9610.804	12.41	42.737	13.09
10.814	12.47	42.743	13.12
10.823	12.53	9644.711	12.34
10.831	12.62	44.717	12.34
9611.829	12.63	44.722	12.34
11.840	12.63	44.728	12.31
11.848	12.44	44.734	12.45
11.857	12.59	9645.727	13.27
11.865	12.57	45.732	13.23
9614.764	12.31	45.737	13.23
14.770	12.44	45.743	13.23
14.775	12.48	45.761	13.18
14.780	12.41	9648.674	12.98
14.820	12.35	48.680	12.99
14.826	12.40	48.686	12.94
14.830	12.35	9698.624	12.89
14.835	12.55	9910.910	13.82
9624.762	12.72	10.924	13.04
24.773	12.70	10.929	13.07
24.782	12.76	9913.926	12.58
24.788	12.72	13.932	12.62
9627.801	12.67	9945.892	12.56
27.808	12.68	45.898	12.58
27.814	12.70	45.902	12.53
27.820	12.77	9948.892	12.77
9628.750	12.73	48.898	12.85
28.755	12.99	9966.860	12.57
28.761	12.70	10013.712	12.54
28.767	12.77	13.718	12.55
		13.722	12.52