



Universiteit
Leiden
The Netherlands

New VBLUW observations of the X-ray binary HD 153919 /4U 1700-37/
Genderen, A.M. van; Windhorst, R.A.; Driel, W. van; Bakker, R.; Wesselink, T.J.H.;
Hammerschlag-Hensberge, G.

Citation

Genderen, A. M. van, Windhorst, R. A., Driel, W. van, Bakker, R., Wesselink, T. J. H., & Hammerschlag-Hensberge, G. (1981). New VBLUW observations of the X-ray binary HD 153919 /4U 1700-37/. *Astronomy And Astrophysics Supplement Series*, 44, 83-86. Retrieved from <https://hdl.handle.net/1887/7064>

Version: Not Applicable (or Unknown)

License:

Downloaded from: <https://hdl.handle.net/1887/7064>

Note: To cite this publication please use the final published version (if applicable).

Astron. Astrophys. Suppl. Ser. 44, 83-86 (1981)**NEW VBLUW OBSERVATIONS OF THE X-RAY BINARY HD 153919
(4U 1700-37)**A. M. VAN GENDEREN, R. A. WINDHORST, W. VAN DRIEL, R. BAKKER (*),
T. J. H. WESSELINK (*) and G. HAMMERSCHLAG-HENSBERGE (*)Leiden Observatory, Postbus 9513, 2300 RA Leiden, The Netherlands
(*) Astronomical Institute, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands*Received June 30, accepted July 30, 1980***Summary.**-New results of *VBLUW* (Walraven system) observations performed in 1977 and 1978 are presented. Those of 1977 consist of five long runs near the deepest minimum and the rising branch and a number of nightly averages. Those of 1978 consist of two long runs of the descending branch to the deepest minimum.**Key words:** X-ray binaries - Photometry - Variable stars**1. Introduction.**- In a series of papers *VBLUW* photometry (Walraven system) of the X-ray binary HD 153919 (4U 1700-37) has been described and analysed (van Genderen and Uiterwaal, 1976, 1978 ; van Genderen, 1977 and van Paradijs et al., 1978).The interesting aspects of the light-curve made it necessary to perform new *VBLUW* photometry and in particular during long runs.One long run made in 1978 (May 29/30) has been discussed already by Hammerschlag-Hensberge et al. (1979) in connection with a possible ~ 100 min. periodicity in the optical data as suggested by Kruszewski (1978).

The general photometric characteristics of all the 1977 and 1978 data presented here, will be discussed in the Main Journal (van Genderen and Windhorst, 1980).

2. The tables.- Table I lists the individual observations of five long runs of the 1977 season near the deepest minimum and the steep rising branch.Table II lists the nightly averages of a number of nights in 1977 (n = the number of individual observations).

Table III lists the individual observations of two long runs of the 1978 season during the descending branch to the deepest minimum.

All observations are made relative to the comparison star HD 153767, the same as used in the previous years. Corrections for differential extinction are applied as well as heliocentric corrections for the Julian Dates.

Acknowledgements.- A part of the reduction has been made by a computer program written by Dr. J. Tinbergen and Mr. J.J. Schafgans. Our thanks are due to Mr. J.J. Schafgans and Mr. F. van Leeuwen for taking care of a few other programs for processing the data.**References**

- Van GENDEREN, A.M. and UITERWAAL, G.M. : 1976, *Astron. Astrophys.* 52, 139.
 Van GENDEREN, A.M. : 1977, *Astron. Astrophys.* 54, 683.
 Van GENDEREN, A.M. and UITERWAAL, G.M. : 1978, *Astron. Astrophys. Suppl. Ser.* 34, 439.
 Van GENDEREN, A.M. and WINDHORST, R.A. : 1980, in press.
 HAMMERSCHLAG-HENSBERGE, G., HENRICH, H.F. and SHAHAM, J. : 1979, *Astrophys. J.* 228, L75.
 KRUSZEWSKI, A. : 1978, *Inf. Bull. Var. Stars* No. 1424
 Van PARADIJS, J.A., HAMMERSCHLAG-HENSBERGE, G. and ZUIDERWIJK, E.J. : 1978, *Astron. Astrophys. Suppl. Ser.* 31, 189.

Send offprint requests to : A.M. van Genderen

TABLE I.- *The individual observations of HD 153919 relative to the comparison star (in log intensity scale) in 1977 (long runs)*

J.D. Hel. - 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
304.236	.3403	.1030	-.3662	-.050	-.0967
.246	.3399	.1039	-.3612	-.069	-.0998
.251	.3405	.1034	-.3632	-.048	-.0992
.253	.3381	.1064	-.3613	-.046	-.0990
.256	.3437	.1059	-.3665	-.045	-.0940
.258	.3357	.1090	-.3632	-.058	-.0972
.260	.3438	.1063	-.3715	-.040	-.0944
.263	.3420	.1033	-.3655	-.055	-.0930
.268	.3399	.1049	-.3666	-.049	-.0932
.271	.3358	.1031	-.3617	-.053	-.0969
.275	.3404	.1060	-.3652	-.042	-.0966
.278	.3386	.1052	-.3685	-.054	-.1005
.280	.3383	.1042	-.3666	-.052	-.0975
.283	.3359	.1048	-.3684	-.052	-.0977
.285	.3352	.1062	-.3688	-.044	-.1003
.289	.3376	.1046	-.3689	-.045	-.0968
.292	.3448	.1066	-.3740	-.052	-.0963
.294	.3408	.1066	-.3696	-.047	-.0932
.296	.3404	.1068	-.3680	-.046	-.0984
.299	.3424	.1073	-.3703	-.035	-.0974
.303	.3395	.1050	-.3693	-.040	-.0982
.306	.3451	.1075	-.3724	-.041	-.0958
.308	.3332	.1058	-.3665	-.046	-.0984
.310	.3399	.1088	-.3695	-.044	-.0983
.312	.3402	.1061	-.3682	-.054	-.1019
.316	.3412	.1068	-.3697	-.041	-.0953
.319	.3398	.1060	-.3688	-.052	-.0978
.321	.3414	.1060	-.3699	-.045	-.0985
.324	.3403	.1053	-.3750	-.040	-.0997
.326	.3416	.1079	-.3755	-.031	-.0964
.330	.3380	.1043	-.3669	-.043	-.1007
.332	.3392	.1046	-.3737	-.050	-.1002
.335	.3382	.1018	-.3683	-.055	-.1026
.337	.3380	.1052	-.3702	-.051	-.1033
.339	.3373	.1043	-.3674	-.050	-.0977
.343	.3389	.1081	-.3651	-.047	-.0982
.346	.3344	.1029	-.3679	-.059	-.1020
.348	.3412	.1074	-.3686	-.042	-.0961
.350	.3373	.1051	-.3684	-.046	-.0993
.353	.3387	.1061	-.3631	-.056	-.0971
.357	.3408	.1070	-.3707	-.054	-.0982
.359	.3367	.1065	-.3676	-.062	-.0977
.362	.3417	.1097	-.3737	-.044	-.0953
.364	.3375	.1045	-.3705	-.040	-.0994
.366	.3393	.1056	-.3712	-.042	-.1010
.370	.3374	.1092	-.3707	-.039	-.0971
.373	.3415	.1074	-.3694	-.055	-.0981
.375	.3423	.1080	-.3712	-.053	-.0989

J.D. Hel. - 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
304.377	.3367	.1062	-.3646	-.055	-.1012
.380	.3349	.1058	-.3621	-.062	-.1010
.384	.3408	.1051	-.3767	-.053	-.1022
.390	.3415	.1062	-.3706	-.051	-.0992
.392	.3341	.1042	-.3645	-.060	-.1001
.394	.3362	.1037	-.3686	-.045	-.0998
.397	.3404	.1060	-.3692	-.047	-.1026
.399	.3362	.1033	-.3680	-.053	-.1030
.406	.3346	.1042	-.3665	-.049	-.0988
.409	.3383	.1059	-.3723	-.047	-.0998
.412	.3416	.1061	-.3749	-.034	-.0991
.416	.3342	.1051	-.3676	-.053	-.1023
.421	.3383	.1066	-.3662	-.048	-.0981
.423	.3427	.1080	-.3711	-.042	-.0986
.426	.3404	.1094	-.3676	-.057	-.0998
.430	.3443	.1102	-.3756	-.052	-.1009
.435	.3347	.1036	-.3701	-.048	-.1018
.437	.3351	.1044	-.3701	-.050	-.1018
.440	.3367	.1044	-.3668	-.042	-.0993
.443	.3396	.1054	-.3649	-.056	-.0997
.447	.3397	.1048	-.3712	-.054	-.0986
.450	.3375	.1069	-.3719	-.054	-.1002
.452	.3379	.1065	-.3724	-.048	-.0979
.455	.3356	.1051	-.3707	-.048	-.1000
.460	.3402	.1082	-.3730	-.053	-.1008
.462	.3402	.1055	-.3705	-.044	-.1003
.465	.3392	.1066	-.3688	-.045	-.0977
.467	.3396	.1068	-.3704	-.048	-.0979
.475	.3402	.1051	-.3717	-.039	-.1009
.478	.3362	.1037	-.3679	-.049	-.0997
.480	.3358	.1051	-.3708	-.053	-.1018
.483	.3403	.1081	-.3733	-.046	-.1008
.488	.3359	.1036	-.3689	-.045	-.0996
.491	.3356	.1029	-.3698	-.046	-.1013
.493	.3415	.1067	-.3778	-.038	-.0983
.496	.3375	.1043	-.3745	-.043	-.0995
.499	.3292	.0987	-.3655	-.055	-.1036
.505	.3354	.1033	-.3704	-.057	-.1010
.507	.3346	.1039	-.3688	-.046	-.0993
.509	.3380	.1034	-.3730	-.046	-.1008
.512	.3341	.1048	-.3708	-.055	-.1013
.515	.3411	.1051	-.3720	-.041	-.0967
.519	.3377	.1059	-.3674	-.055	-.0999
.522	.3401	.1037	-.3722	-.051	-.0999
.524	.3396	.1037	-.3745	-.056	-.1034
.527	.3353	.1045	-.3695	-.056	-.1016
.529	.3383	.1059	-.3684	-.050	-.0988
.535	.3355	.1047	-.3668	-.056	-.0983
.537	.3370	.1043	-.3672	-.054	-.1012
.540	.3392	.1037	-.3696	-.050	-.1013
.542	.3371	.1031	-.3701	-.052	-.0986

J.D. Hel. - 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
304.545	.3383	.1039	-.3699	-.055	-.0958
.551	.3380	.1049	-.3687	-.034	-.0995
.553	.3421	.1047	-.3737	-.038	-.1004
.556	.3383	.1043	-.3727	-.051	-.1008
.558	.3401	.1041	-.3734	-.051	-.1003
.561	.3379	.1053	-.3676	-.040	-.0990
.565	.3361	.1048	-.3718	-.042	-.0969
.568	.3425	.1042	-.3713	-.042	-.0972
.570	.3420	.1063	-.3710	-.050	-.0996
.572	.3345	.1057	-.3680	-.051	-.1009
.575	.3394	.1060	-.3678	-.049	-.0994
318.262	.3483	.1036	-.3686	-.058	-.1018
.266	.3481	.1028	-.3705	-.054	-.1001
.269	.3476	.1033	-.3715	-.057	-.1032
.271	.3479	.1027	-.3705	-.049	-.1018
.274	.3491	.1037	-.3684	-.043	-.0996
.280	.3488	.1042	-.3709	-.049	-.1000
.284	.3496	.1035	-.3722	-.046	-.1026
.288	.3497	.1034	-.3699	-.050	-.1009
.294	.3513	.1043	-.3709	-.045	-.1004
.297	.3509	.1060	-.3730	-.043	-.1033
.301	.3498	.1042	-.3724	-.042	-.1015
.308	.3487	.1045	-.3736	-.054	-.1034
.313	.3487	.1027	-.3731	-.050	-.1029
.317	.3488	.1036	-.3737	-.042	-.1038
.330	.3494	.1052	-.3645	-.035	-.0989
.335	.3503	.1041	-.3702	-.044	-.1005
.339	.3504	.1033	-.3740	-.049	-.1023
.345	.3502	.1032	-.3695	-.048	-.1000
.349	.3505	.1035	-.3703	-.056	-.1020
.353	.3502	.1021	-.3731	-.056	-.1026
.360	.3506	.1036	-.3744	-.042	-.1047
.363	.3505	.1030	-.3721	-.048	-.1033
.367	.3509	.1042	-.3723	-.058	-.1047
.373	.3509	.1036	-.3695	-.044	-.1027
.377	.3521	.1033	-.3687	-.045	-.1017
.381	.3520	.1042	-.3726	-.054	-.1032
.387	.3509	.1042	-.3736	-.042	-.1022
.391	.3512	.1041	-.3706	-.044	-.0997
.394	.3506	.1036	-.3713	-.054	-.1026
.401	.3521	.1039	-.3703	-.048	-.1009
.404	.3500	.1029	-.3740	-.055	-.1041
.408	.3508	.1041	-.3736	-.047	-.1039
.414	.3501	.1019	-.3681	-.050	-.1020
.418	.3497	.1018	-.3714	-.038	-.1016
.422	.3513	.1027	-.3728	-.051	-.1021
.429	.3514	.1038	-.3704	-.042	-.1028
.432	.3532	.1029	-.3655	-.031	-.0998
.436	.3512	.1031	-.3719	-.049	-.1030
.451	.3513	.1039	-.3708	-.043	-.1031
.455	.3506	.1027	-.3712	-.052	-.1030

J.D. Hel. - 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
318.458	.3500	.1031	-.3724	-.054	-.1033
.465	.3517	.1042	-.3721	-.048	-.1036
.469	.3517	.1040	-.3721	-.049	-.1030
.472	.3518	.1044	-.3756	-.055	-.1053
.479	.3512	.1039	-.3706	-.053	-.1029
.483	.3509	.1034	-.3681	-.046	-.1012
.486	.3519	.1036	-.3715	-.045	-.1012
.493	.3503	.1036	-.3689	-.046	-.1012
.496	.3510	.1027	-.3708	-.051	-.1012
.500	.3517	.1033	-.3668	-.043	-.1037
.506	.3514	.1027	-.3702	-.054	-.1010
.509	.3517	.1038	-.3711	-.038	-.1004
.513	.3502	.1023	-.3732	-.039	-.1016
.519	.3500	.1019	-.3719	-.049	-.1031
.522	.3492	.1017	-.3729	-.059	-.1020
.525	.3489	.0999	-.3702	-.050	-.1024
328.251	.3393	.1050	-.3684	-.052	-.1023
.254	.3384	.1042	-.3691	-.040	-.1006
.256	.3410	.1049	-.3701	-.034	-.0977
.258	.3391	.1027	-.3705	-.036	-.0989
.263	.3372	.1043	-.3689	-.044	-.1003
.267	.3376	.1030	-.3688	-.049	-.1006
.270	.3393	.1042	-.3683	-.053	-.0991
.277	.3414	.1056	-.3666	-.042	-.0986
.282	.3396	.1057	-.3753	-.049	-.1033
.333	.3397	.1042	-.3726	-.051	-.1045
.336	.3398	.1039	-.3695	-.041	-.1027
.338	.3397	.1044	-.3700	-.049	-.1023
.340	.3375	.1045	-.3693	-.055	-.1024
.345	.3399	.1044	-.3704	-.053	-.1024
.349	.3402	.1047	-.3733	-.055	-.1061
.352	.3405	.1045	-.3705	-.050	-.1022
.357	.3382	.1055	-.3718	-.050	-.1060
.368	.3418	.1057	-.3695	-.052	-.1006
.370	.3407	.1041	-.3709	-.050	-.1024
.372	.3374	.1015	-.3712	-.055	-.1023
.377	.3384	.1035	-.3714	-.035	-.1033
.381	.3397	.1052	-.3720	-.042	-.1016
.384	.3403	.1061	-.3747	-.054	-.1024
.390	.3389	.1032	-.3685	-.053	-.1038
.393	.3408	.1030	-.3703	-.065	-.1038
.397	.3426	.1054	-.3722	-.051	-.1032
.402	.3396	.1027	-.3687	-.	

TABLE I.- (continued.)

J.D.HeI.- 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
328.442	.3420	.1050	-.3724	-.060	-.1040
.446	.3427	.1046	-.3672	-.052	-.1006
.451	.3409	.1042	-.3642	-.040	-.1010
.455	.3412	.1038	-.3697	-.047	-.1002
.458	.3442	.1050	-.3732	-.051	-.1022
.464	.3425	.1021	-.3718	-.038	-.1011
.468	.3429	.1034	-.3694	-.026	-.0998
.471	.3424	.1022	-.3666	-.035	-.0990
.477	.3423	.1031	-.3677	-.037	-.1003
.481	.3429	.1038	-.3722	-.053	-.1047
.484	.3424	.1042	-.3713	-.049	-.1018
.490	.3427	.1034	-.3739	-.046	-.1011
.494	.3446	.1042	-.3737	-.042	-.1022
.497	.3433	.1050	-.3710	-.035	-.1032
.502	.3435	.1022	-.3750	-.049	-.0999
.504	.3463	.1025	-.3746	-.054	-.1025
.507	.3458	.1026	-.3716	-.077	-.1007
.509	.3435	.1026	-.3718	-.072	-.1028
.513	.3461	.0997	-.3713	-.064	-.0978
.516	.3449	.1014	-.3728	-.056	-.1010
.518	.3485	.1036	-.3691	-.057	-.1007
.523	.3473	.1028	-.3687	-.052	-.0992
.526	.3475	.1065	-.3669	-.048	-.0966
.532	.3439	.1037	-.3720	-.044	-.1011
.535	.3473	.1065	-.3735	-.049	-.1010
335.264	.3363	.1048	-.3652	+ .006	-.0963
.267	.3417	.1008	-.3678	+ .004	-.1001
.273	.3373	.1038	-.3710	-.027	-.0975
.277	.3415	.1044	-.3708	-.035	-.0974
.284	.3426	.1003	-.3732	-.023	-.0986
.288	.3406	.1035	-.3697	-.061	-.0983
.292	.3385	.1028	-.3670	-.089	-.0971
.296	.3387	.1036	-.3680	-.083	-.0990
.302	.3421	.1031	-.3705	-.055	-.0973
.306	.3434	.1036	-.3698	-.108	-.1012
.310	.3433	.1044	-.3702	-.081	-.1014
.314	.3439	.1043	-.3706	-.070	-.1024
.319	.3446	.1028	-.3730	-.024	-.1023
.323	.3411	.1019	-.3707	-.032	-.1034
.327	.3392	.1029	-.3668	-.020	-.1018
.332	.3447	.1027	-.3751	-.049	-.1025
.337	.3444	.1035	-.3736	-.093	-.1033
.341	.3429	.1037	-.3710	-.094	-.1034
.345	.3445	.1036	-.3761	-.104	-.1041
.349	.3463	.1042	-.3764	-.084	-.1062
.355	.3374	.0991	-.3827	-.105	-.1014
.359	.3432	.1031	-.3702	-.109	-.0999
.363	.3472	.1053	-.3712	-.112	-.0992
.367	.3457	.1052	-.3722	-.069	-.1015
.372	.3449	.1024	-.3711	-.035	-.0995
.376	.3455	.1033	-.3700	-.034	-.1000

J.D.HeI.- 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
335.380	.3453	.1017	-.3707	-.033	-.1010
.383	.3470	.1045	-.3724	-.033	-.1028
.389	.3458	.1020	-.3675	-.039	-.0981
.393	.3459	.1034	-.3719	-.053	-.1013
.396	.3466	.1024	-.3694	-.050	-.1001
.398	.3450	.1021	-.3666	-.058	-.0986
.401	.3460	.1010	-.3677	-.056	-.0961
.406	.3454	.1035	-.3718	-.094	-.1017
.410	.3481	.1040	-.3723	-.097	-.1031
.417	.3468	.1035	-.3723	-.115	-.1013
.420	.3472	.1026	-.3684	-.099	-.1000
.425	.3477	.1035	-.3739	-.016	-.1011
.428	.3470	.1031	-.3735	-.036	-.1008
.431	.3481	.1033	-.3709	-.009	-.1015
.433	.3478	.1030	-.3699	-.015	-.1030
.435	.3490	.1035	-.3713	-.039	-.1026
.440	.3480	.1010	-.3738	-.018	-.1022
.442	.3467	.1028	-.3747	-.024	-.1016
.444	.3518	.1040	-.3743	-.034	-.1023
.447	.3526	.1026	-.3707	-.003	-.1024
.449	.3519	.1036	-.3728	+ .005	-.1017
.454	.3504	.1026	-.3617	-.031	-.1024
.456	.3488	.1036	-.3701	-.001	-.1003
.458	.3494	.1001	-.3693	-.038	-.0972
.461	.3488	.1032	-.3729	-.119	-.1004
.463	.3493	.1015	-.3726	-.102	-.0988
.467	.3495	.1015	-.3709	-.041	-.0997
.470	.3482	.1029	-.3704	-.061	-.0978
.472	.3474	.1016	-.3673	-.066	-.0990
.475	.3503	.1053	-.3714	-.070	-.0985
.477	.3493	.1034	-.3677	-.043	-.0984
.482	.3513	.1048	-.3671	-.003	-.1004
.484	.3490	.1032	-.3697	-.027	-.0994
.487	.3525	.1040	-.3703	-.024	-.0969
.489	.3519	.1049	-.3728	-.010	-.0988
.494	.3495	.1021	-.3738	-.026	-.1020
.496	.3502	.1032	-.3760	-.010	-.0994
.499	.3496	.1016	-.3690	-.040	-.0964
.503	.3501	.1045	-.3719	-.189	-.1001
.506	.3525	.1034	-.3748	-.117	-.0998
.508	.3501	.1015	-.3743	-.098	-.1006
345.327	.3486	.1028	-.3788	-.046	-.1027
.328	.3575	.1017	-.3722	-.047	-.0993
.329	.3480	.1037	-.3742	-.044	-.1003
.330	.3509	.1036	-.3725	-.042	-.0995
.332	.3484	.1046	-.3731	-.036	-.0997
.337	.3457	.1048	-.3661	-.047	-.1006
.339	.3484	.1055	-.3700	-.032	-.1021
.340	.3506	.1029	-.3718	-.039	-.1016
.341	.3523	.1023	-.3725	-.050	-.1026

TABLE I.- (continued)

J.D.HeI.- 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
345.343	.3484	.1032	-.3701	-.054	-.1023
.348	.3506	.1045	-.3703	-.064	-.1012
.349	.3489	.1056	-.3706	-.057	-.1010
.350	.3420	.1067	-.3673	-.040	-.1001
.352	.3454	.1069	-.3658	-.038	-.0989
.353	.3411	.1065	-.3676	-.053	-.0987
.358	.3470	.1035	-.3714	-.048	-.1027
.360	.3391	.1054	-.3654	-.045	-.0998
.361	.3342	.1075	-.3682	-.037	-.0990
.362	.3389	.1049	-.3682	-.037	-.0996
.363	.3424	.1045	-.3709	-.052	-.1005

TABLE II.- The average photometric data for HD 153919 relative to the comparison star (in log intensity scale) in 1977 (short runs)

J.D.HeI.- 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$	n
334.336	.3565	.1026	-.3708	-.050	-.1001	8
337.453	.3597	.1028	-.3702	-.045	-.1003	10
342.512	.3521	.1010	-.3718	-.044	-.0986	8
343.364	.3378	.1037	-.3724	-.047	-.1020	8
353.320	.3524	.1026	-.3689	-.052	-.1010	9
355.372	.3405	.1019	-.3691	-.048	-.0996	39
360.428	.3519	.1015	-.3698	-.056	-.1014	15
371.322	.3455	.1022	-.3692	-.050	-.1013	35

TABLE III.- The individual observations of HD 153919 relative to the comparison star (in log intensity scale) in 1978 (long runs).

J.D.HeI.- 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
658.271	.3529	.1026	-.3665	-.054	-.0981
.277	.3557	.1046	-.3647	-.040	-.0930
.280	.3582	.1034	-.3660	-.037	-.0942
.284	.3555	.1030	-.3709	-.047	-.0982
.287	.3525	.1041	-.3696	-.044	-.0980
.293	.3562	.1037	-.3649	-.050	-.0981
.296	.3561	.1028	-.3688	-.054	-.0985
.300	.3558	.1042	-.3713	-.050	-.0961
.304	.3553	.1016	-.3671	-.044	-.0948
.309	.3511	.1015	-.3692	-.028	-.0957
.312	.3548	.1030	-.3726	-.028	-.0989
.316	.3519	.1029	-.3674	-.022	-.0920
.319	.3526	.1004	-.3672	-.037	-.0966
.325	.3515	.1023	-.3690	-.046	-.0978
.329	.3522	.1028	-.3670	-.049	-.0969
.332	.3580	.1000	-.3647	-.040	-.0952
.336	.3502	.1024	-.3688	-.051	-.1000
.341	.3540	.1031	-.3707	-.058	-.0967
.345	.3517	.1013	-.3716	-.051	-.0984
.348	.3498	.1025	-.3693	-.058	-.0987
.351	.3573	.1011	-.3653	-.037	-.0970
.357	.3532	.1027	-.3713	-.051	-.1015
.360	.3490	.1033	-.3744	-.069	-.1040
.364	.3487	.1023	-.3733	-.067	-.1025
.367	.3518	.1007	-.3698	-.054	-.0993
.373	.3497	.1034	-.3749	-.061	-.1036
.376	.3501	.1032	-.3724	-.059	-.1008
.380	.3493	.1042	-.3703	-.064	-.1011
.383	.3510	.1033	-.3699	-.057	-.0990
.387	.3526	.1021	-.3719	-.050	-.0965
.390	.3508	.1010	-.3694	-.055	-.0968
.394	.3521	.1024	-.3727	-.070	-.1006
.402	.3495	.1028	-.3679	-.029	-.0958
.406	.3486	.1015	-.3710	-.043	-.0980
.409	.3479	.1019	-.3690	-.033	-.0958
.413	.3518	.1026	-.3725	-.062	-.1001
.419	.3537	.1024	-.3699	-.062	-.1010
.423	.3479	.1011	-.3650	-.044	-.0978
.426	.3484	.1012	-.3707	-.059	-.0990
.432	.3499	.1017	-.3703	-.037	-.0972
.435	.3476	.1011	-.3704	-.057	-.1000
.439	.3498	.1026	-.3692	-.066	-.1010
.444	.3478	.1040	-.3723	-.042	-.0999
.449	.3525	.1038	-.3700	-.054	-.0992
.452	.3503	.1053	-.3721	-.075	-.1007
.457	.3512	.1022	-.3668	-.045	-.0965
.460	.3486	.1023	-.3668	-.049	-.0997
.461	.3477	.1014	-.3678	-.045	-.1019

TABLE III.- (continued)

J.D. Hel. - 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
658.464	.3499	.1024	-.3702	-.051	-.0991
.470	.3518	.1044	-.3700	-.060	-.0982
.475	.3530	.1038	-.3674	-.047	-.0972
.478	.3473	.1025	-.3672	-.045	-.0957
.483	.3508	.1018	-.3704	-.054	-.1019
.487	.3502	.1034	-.3696	-.059	-.0987
.491	.3514	.1041	-.3720	-.068	-.0978
.496	.3502	.1025	-.3782	-.073	-.1076
.500	.3465	.1028	-.3739	-.062	-.1062
.504	.3514	.1034	-.3671	-.038	-.0972
.512	.3457	.1004	-.3663	-.033	-.0969
.515	.3504	.1033	-.3681	-.040	-.0960
.519	.3488	.1035	-.3701	-.052	-.1006
.525	.3478	.1013	-.3707	-.051	-.0975
.528	.3502	.1022	-.3705	-.059	-.0981
.534	.3457	.1020	-.3653	-.019	-.0979
.544	.3494	.1034	-.3704	-.034	-.0995
.547	.3484	.1030	-.3636	-.035	-.0940
.553	.3434	.1012	-.3658	-.030	-.0966
.557	.3569	.1070	-.3675	-.079	-.0979
.564	.3489	.1045	-.3648	-.079	-.0963
.568	.3482	.1036	-.3752	-.081	-.1029
.574	.3491	.0998	-.3701	-.060	-.1004
.577	.3535	.1019	-.3740	-.087	-.1028
.583	.3520	.1043	-.3706	-.070	-.0996
.587	.3455	.1054	-.3683	-.051	-.0974
.592	.3533	.1045	-.3690	-.051	-.0978
.596	.3502	.1034	-.3640	-.034	-.0956
.602	.3539	.1009	-.3689	-.068	-.1006
.606	.3485	.1051	-.3653	-.032	-.0942
.611	.3514	.1044	-.3683	-.041	-.0965
.614	.3514	.1031	-.3695	-.055	-.0970
.616	.3532	.1052	-.3684	-.042	-.0977
.621	.3494	.1042	-.3686	-.046	-.0963
.625	.3522	.1047	-.3702	-.045	-.0982
.631	.3548	.1033	-.3712	-.059	-.0972
.635	.3414	.1011	-.3706	-.028	-.0974
.640	.3486	.1049	-.3705	-.053	-.0955
.644	.3470	.0989	-.3710	-.037	-.0985
.650	.3506	.1036	-.3710	-.082	-.0980
.654	.3492	.1049	-.3680	-.066	-.0972
665.261	.3551	.1021	-.3657	-.036	-.0946
.264	.3453	.1050	-.3670	-.084	-.0993
.268	.3515	.1029	-.3687	-.072	-.0962
.273	.3528	.1028	-.3686	-.042	-.0955
.277	.3513	.1030	-.3689	-.042	-.0971
.280	.3512	.1045	-.3675	-.039	-.0982
.284	.3564	.1017	-.3690	-.048	-.0986
.289	.3495	.1008	-.3688	-.086	-.0981

J.D. Hel. - 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
665.304	.3555	.0996	-.3695	-.026	-.0975
.308	.3462	.1036	-.3704	-.043	-.0963
.311	.3511	.1051	-.3708	-.058	-.0955
.315	.3576	.1022	-.3692	-.052	-.0957
.320	.3439	.1033	-.3704	-.050	-.0983
.324	.3477	.1042	-.3679	-.053	-.0982
.327	.3482	.1049	-.3715	-.052	-.0990
.331	.3447	.1047	-.3684	-.040	-.0979
.334	.3439	.1015	-.3680	-.041	-.0986
.339	.3449	.1033	-.3676	-.036	-.0968
.342	.3475	.1002	-.3681	-.049	-.0991
.346	.3488	.1032	-.3695	-.065	-.1007
.349	.3497	.1031	-.3708	-.050	-.1002
.353	.3517	.1006	-.3726	-.052	-.1029
.356	.3451	.1038	-.3686	-.050	-.0995
.361	.3482	.1033	-.3666	-.053	-.0973
.365	.3465	.1026	-.3722	-.056	-.1044
.368	.3484	.1021	-.3723	-.053	-.1004
.371	.3476	.1047	-.3723	-.050	-.1001
.375	.3478	.1040	-.3726	-.062	-.1055
.380	.3501	.1036	-.3678	-.039	-.0985
.384	.3499	.1029	-.3731	-.060	-.1029
.387	.3487	.1031	-.3715	-.046	-.1004
.391	.3517	.1021	-.3742	-.044	-.1010
.396	.3463	.1031	-.3716	-.061	-.0995
.398	.3493	.1028	-.3706	-.056	-.1007
.402	.3434	.1004	-.3683	-.043	-.0979
.404	.3457	.1010	-.3688	-.052	-.1006
.408	.3468	.1044	-.3734	-.070	-.1023
.415	.3505	.1041	-.3763	-.083	-.1047
.419	.3501	.1041	-.3733	-.082	-.1036
.423	.3495	.1028	-.3679	-.040	-.0979
.429	.3418	.1047	-.3720	-.055	-.0997
.436	.3445	.1027	-.3706	-.043	-.1031
.440	.3479	.1020	-.3707	-.052	-.1042
.446	.3383	.1018	-.3683	-.010	-.1004
.449	.3559	.1018	-.3698	-.028	-.1001
.453	.3524	.1006	-.3705	-.037	-.0981
.456	.3481	.1005	-.3725	-.052	-.1033
.460	.3456	.1041	-.3675	-.041	-.1008
.464	.3447	.1038	-.3704	-.065	-.1044
.468	.3475	.1011	-.3702	-.052	-.1009
.471	.3472	.1014	-.3678	-.045	-.0990
.476	.3439	.1030	-.3679	-.044	-.0989
.482	.3430	.1021	-.3689	-.031	-.0991
.486	.3400	.1027	-.3654	-.034	-.0976
.489	.3454	.1004	-.3700	-.055	-.1029
.492	.3462	.1029	-.3703	-.051	-.1007
.495	.3495	.1034	-.3693	-.053	-.0984
.502	.3448	.1028	-.3691	-.029	-.0991
.505	.3472	.1018	-.3690	-.037	-.0978
.509	.3477	.1035	-.3683	-.029	-.0972
.513	.3452	.1041	-.3724	-.058	-.0991

J.D. Hel. - 2443000	ΔV	$\Delta(V-B)$	$\Delta(B-U)$	$\Delta(U-W)$	$\Delta(B-L)$
665.517	.3471	.1023	-.3664	-.028	-.0978
.521	.3493	.1024	-.3641	-.031	-.0965
.525	.3471	.1036	-.3716	-.039	-.1027
.530	.3459	.1018	-.3714	-.038	-.1017
.533	.3412	.1031	-.3661	-.046	-.0981
.537	.3445	.1015	-.3697	-.047	-.1007
.540	.3412	.1018	-.3715	-.042	-.1007
.545	.3440	.1037	-.3733	-.038	-.1000
.548	.3434	.1037	-.3729	-.042	-.0997
.553	.3455	.1036	-.3696	-.048	-.0987
.556	.3446	.1022	-.3698	-.048	-.0997
.563	.3455	.1028	-.3657	-.043	-.1001
.566	.3456	.1021	-.3665	-.040	-.0983
.570	.3433	.1037	-.3705	-.039	-.1012
.574	.3449	.1033	-.3732	-.052	-.1007
.579	.3408	.1042	-.3669	-.020	-.0949
.584	.3446	.1041	-.3687	-.034	-.0981
.587	.3424	.1037	-.3681	-.030	-.0974
.592	.3425	.1033	-.3687	-.045	-.0971
.596	.3464	.1030	-.3687	-.048	-.0996
.600	.3416	.1033	-.3700	-.038	-.1004
.603	.3444	.1022	-.3690	-.020	-.1003
.607	.3464	.1029	-.3677	-.026	-.0963
.611	.3448	.1011	-.3690	-.044	-.0950
.615	.3418	.1022	-.3695	-.019	-.0974
.621	.3435	.1057	-.3749	-.026	-.1007
.627	.3417	.1064	-.3684	-.041	-.0949
.632	.3401	.1033	-.3656	-.065	-.0952
.636	.3419	.1022	-.3697	-.058	-.0953
.639	.3372	.0977	-.3680	-.012	-.1003
.643	.3429	.1051	-.3651	-.035	-.0960