

Observation Report for the Year 2012: Humacao University Observatory

R.J. Muller, J.C. Cersosimo, D. Cotto, R. Rodriguez, M. Diaz, M. Rosario, Y. Nieves,
E. Franco, A. Lopez, B.S. Torres, N. Vergara, Y. Del Valle, D. Ortiz, G. Espinosa, M. Reyes,
O. Carronero, J. Martinez

Humacao University Observatory
Department of Physics and Electronics
The University of Puerto Rico at Humacao
Call Box 860, Humacao, Puerto Rico 00792
rjmullerporrata@gmail.com

Abstract: We report on the measurement of position angle and separation of 93 binary pairs. The data was obtained using the NURO Telescope at the Anderson Mesa location of Lowell Observatory, 20 miles east of Flagstaff, Arizona on May and September 2012. We gathered the data using the 2K x 2K CCD camera, -NASACAM- at the prime focus of the 31 inch telescope. The data was transferred and analyzed at the Humacao University Observatory by undergraduate students undertaking research projects.

Introduction

We obtained CCD images of 93 binaries with the NASA CAM CCD at the prime focus of the National Undergraduate Research Observatory (NURO) telescope. From the analysis of those images, we obtained the position angle and separation of the binaries.

The Humacao Campus of the University of Puerto Rico is a member of NURO, a consortium of primarily undergraduate institutions (www.nuro.nau.edu) with access to a 31 inch telescope, property of Lowell Observatory. It is located roughly 20 miles east of Flagstaff, Arizona at the Anderson Mesa, at an altitude of 7200 feet. We use the NURO telescope twice a year, and in 2012 we visited the telescope on May 28, 29, and 30, and also on September 4, 5, and 6. The undergraduate students that visited on those dates operated the telescope, gathered the data and brought it to the Humacao Campus Observatory of the University of Puerto Rico for analysis. The separation measurements were done by pixelizing the images, and also used software for measuring the separation of those binaries in close proximity. The position angle was simply extracted from the images. The measurement of the position

angle introduces a systematic error which we call the offset and correct statistically. The Cassegrain telescope has a 2K x 2K CCD camera at its prime focus. This CCD has 15 micron pixels and a field of view of 16 arc minutes. The optical reducer in the optical path was changed preceding our observing run, and it changed our plate scale, so we had to recalculate the plate scale again for this report as we have done before. The plate scale obtained was .456 arcseconds/pixel, and is the value used for this report.

The large number of undergraduate student authors in this report is due to a generational change in the observatory students; those students that acquired the data graduated and a new group of students analyzed and organized the data for the presentation in this report.

Data

Data Tables 1 and 2 present the results for the 93 binaries; Table 1 yields 72 values for our May observing run and Table 2 yields 21 values for the September run. The September run was cut short because of clouds and rain, a very unusual set of circumstances in Flagstaff and surrounding area.

Observation Report for the Year 2012: Humacao University Observatory

Acknowledgements

We want to acknowledge extensive use of the Washington Double Star Catalog of the U.S. Naval Observatory. We also want to thank Ed Anderson, the NU-RO telescope technician, for his effort during our observations. We also want to thank Puerto Rico's NASA Space Grant Consortium for its continuous support of this project.

Table 1. Measurements from May 2012 Observing Run

Name	R.A	DEC.	Magnitudes		ρ	θ	Date
GRV 849	12 02 53.16	23 45 50.8	12.03	12.35	28.95	230.63	0.408
BAL1450	12 03 11.85	00 43 48.8	11.7	12.46	23.21	210.0	0.408
STI 738	12 03 17.6	59 24 05.8	12.24	13.1	6.61	40.0	0.408
STF1594 AC	12 03 28.5	41 24 15.5	10.09	11.1	11.02	144.0	0.408
POU3120	12 04 05.70	23 11 40.6	11.09	13.1	13.55	198.0	0.408
BU 458	12 04 17.11	-21 02 21	7.87	9.97	29.85	234.13	0.408
KZA 26	12 05 07.86	43 22 46.7	13	13.6	17.59	106.46	0.408
HJ 4496	12 06 12.76	-18 53 28	10.05	10.98	10.2	26.63	0.408
STF1622	12 16 07.55	40 39 36.6	5.86	8.71	10.6	265.0	0.408
COU2707	12 30 04.89	22 22 16.5	11.77	14.1	14.29	344.46	0.408
ES 726 AC	12 30 49.06	53 5129.7	10.48	13.6	20.3	177.13	0.408
STF1650	12 31 32.99	24 37 13.1	9.54	10.47	16.99	181.37	0.408
STF1649	12 31 36.46	-11 04 20	7.97	8.43	15.89	193.79	0.408
LDS4224	12 32 13.27	31 47 19.6	13.5	15.0	10.91	313.46	0.408
HJ 211	12 32 21.12	-01 53 33.3	11.86	11.77	11.73	278.13	0.408
LDS4225	12 32 28.75	285412.4	13.3	15.3	16.22	207.63	0.408
POU3152	13 49 38.88	23 28 15.0	12.25	12.05	12.30	12.25	0.408
UC 185	13 53 44.49	12 40 48.4	8.64	13.35	20.74	145.46	0.408
HJ 2699 BC	14 03 04.57	11 54 25.3	13	13.4	14.97	301.13	0.408
HJ 542	14 12 21.20	36 46 12.6	12.9	12.5	12.07	67.6	0.408
POU3162	14 13 23.91	24 24 11.9	12.02	13.8	5.87	347.46	0.408
DAM 79	14 17 01.59	50 43 58.8	11.4	13.6	13.78	55.29	0.41
LDS4521	15 00 47.52	23 06 26.3	15.45	16.42	25.61	338.88	0.41
STF1901	15 00 57.7	31 22 38.2	8.71	10.55	19.62	186.0	0.41
HJ 1266	15 01 07.99	04 15 1 7.0	10.77	12.81	13.69	25.13	0.41
LDS4543	15 20 41.6	26 37 54.9	12.6	18.3	64.11	234.13	0.41
KZA 80	15 20 42.06	31 33 15.1	12.13	12.82	25.33	55.46	0.41
KZA 87	15 24 48.68	29 34 28.4	12	12.5	11.97	0.13	0.41
POU3188	15 25 38.91	24 01 26	12.04	14.4	11.63	21.63	0.41
KZA 90	15 27 25.45	31 01 41.8	12.5	13	20.26	297.46	0.41
HO 629	15 28 20.19	23 41 02.7	8.06	12.2	21.14	111.96	0.41
GRV 907	15 31 20.13	83 63 1.9	9.40	12.49	21.94	163.29	0.41
BRT2420	15 31 33.89	21 11 16.3	10.84	11.50	11.18	312.0	0.41
POU3193	15 35 22.37	24 08 16.8	13.2	13.7	7.48	298.79	0.41
HDS2205	15 38 16.34	-93 42 7.5	9.89	12.39	10.27	47.0	0.41

Table 1 concludes on next page.

Observation Report for the Year 2012: Humacao University Observatory

Table 1 (conclusion). Measurements from May 2012 Observing Run

Name	R. A	DEC.	Magnitudes		ρ	θ	Date
HJ 580	16 02 50.56	37 05 26.8	9.21	12.97	40.25	8.63	0.41
STF1999 AB	16 04 26.0	-11 26 58	7.52	8.05	10.74	101.46	0.41
ARA 433	16 06 35.80	-18 19 12	11.6	14.1	9.93	55.13	0.41
HJ 582	16 07 16.96	35 07 41.6	11.11	13.61	22.01	230.46	0.41
ALI 370	16 07 26.70	354827.8	12.9	13	13.09	146.63	0.41
POU3214	16 07 48.84	230529.9	11.1	13.3	12.6	83.13	0.41
STF2010 AB	16 08 04.6	170249.2	5.1	6.21	27.28	14.63	0.41
BAL 564	16 11 09.67	-20613.7	11.53	11.8	12.45	281.7	0.41
STF2032 AB	16 14 40.85	33 51 31	5.62	6.49	7.5	237.0	0.41
ES 627	16 18 35.71	51 19 51.5	9.88	10.98	12.03	291.0	0.41
BAL2429	16 54 51.18	31 84 0.8	11.77	12.8	11.13	53.63	0.41
ES 1255	17 01 00.5	46 16 26.8	8.19	11.7	7.24	43.63	0.41
WFC 186	17 06 05.4	432857.4	10.81	12.11	17.52	15.88	0.41
STF2123	17 06 57.5	06 48 03.0	9.82	9.98	18.38	219.38	0.41
STF2127	17 07 04.4	31 05 35.1	8.7	12.3	14.5	279.0	0.41
ARA1121	17 07 06.09	-20 14 44	11.8	12.4	8.2	217.38	0.41
SLE 9	17 07 06.3	20 29 21.7	10.49	12.3	20.04	173.13	0.41
BEM 26	17 08 36.72	50 22 45.2	11.06	13.34	15	196.5	0.41
FOX 211	18 00 01.77	-15 12 29	10.19	12.8	13.1	20.0	0.41
SLE 85	18 07 33.1	31 35 3.7	11.2	12.5	10.8	184	0.413
BAL1952	18 07 34.41	22 40 7.8	11.52	12.8	13.48	153.46	0.413
SLE 138	18 07 52.7	30 41 57.2	11.5	12.8	10.46	329.38	0.413
POU3350	18 07 59.95	24 06 00.8	11.8	12	10.19	68.0	0.413
BAL2474	18 08 03.42	34 31 2.1	10.0	11.0	15.89	283.63	0.413
POU3351	18 08 08.78	23 27 12.4	12.05	13.9	10.14	159.79	0.413
ARA 453	18 08 52.23	-18 26 55	10.69	12.50	8.95	57.0	0.413
SLE 111	18 08 54	27 24 56.6	10.8	12.5	14.04	312.63	0.413
ES 1417 AB	18 09 09.15	43 13 48.6	9.21	11.5	13.52	210.63	0.413
BEM 31	18 09 41.21	53 29 31.5	9.90	12.3	11.51	310.46	0.413
STF2293	18 09 53.8	48 24 05.7	8.08	10.34	13.59	83.88	0.413
BAL2483	18 14 41.54	34 20 5.5	12	12.7	12.96	198.13	0.413
ES 646	18 15 09.43	52 09 24.8	8.72	14.1	10.51	194.46	0.413
POU3380	18 17 22.66	24 56 36.2	12.4	13.3	12.75	72.79	0.413
HJ 1349	18 48 48.77	33 19 12.1	8.29	10.7	30.2	94.13	0.413
STF2459	19 07 22	25 58 23.9	9.12	10.07	14.69	231.63	0.413
AG 375	19 14 13.48	26 26 28.4	9.89	10.92	18.07	296.88	0.413
SLE 959 AB	20 11 50.1	37 26 06.8	10.69	12.5	12.55	160.29	0.413

Observation Report for the Year 2012: Humacao University Observatory

Table 2. Measurements from September 2012 Observing Run

Name	R. A	DEC	Magnitudes		ρ	θ	Date
ALI 140	18 11 25.14	35 06 45.5	10.97	11.79	38.32	250.0	0.682
BAL2474	18 08 03.42	03 43 12.1	10	11	17.32	284.27	0.682
HJ 1315	18 09 53.54	29 41 16.1	11.85	13.1	7.48	135	0.682
STF2293	18 09 53.83	48 24 05.7	8.08	10.34	14.28	74	0.682
SEI 559	18 10 27.80	33 55 55.6	11	11	12.65	175	0.682
BAL2481	18 10 37.28	32 72 3.7	11.3	11.3	11.28	106.6	0.682
POU3419	18 32 02.77	25 04 01.7	7.89	12.1	9.14	234.27	0.682
HJ 1375	19 12 29.96	28 14 26.7	11	13.6	14.56	83.93	0.684
POU3940	19 35 12.15	25 01 29.6	10.6	10.7	7.79	25.	0.684
ES 2297	19 37 28.79	33 32 31.2	9.14	9.4	9.1	181	0.684
SMA 101	19 50 48.40	44 44 42.1	12.8	13.2	9.74	48.57	0.684
SEI1012	20 13 02.39	34 50 29	11	11	16.88	55.27	0.684
CHE 235	20 14 36.19	14 52 35.1	12.3	13.6	11.62	29	0.684
POU4500	20 26 52.84	23 40 16.1	11.99	12.1	9.22	274.93	0.684
SEI1483	21 16 06.83	35 48 07.2	12.3	12.7	16.6	24.77	0.684
WSI 23 AC	21 24 42.86	36 30 30.1	11	12.2	10.74	83.92	0.684
STF2800	21 28 43.09	49 52 06.6	9.5	10.41	10.6	233.0	0.684
STI2720	22 21 30.29	58 36 48.7	12.1	12.1	17.67	160.27	0.684
ES 837AC	22 31 45.72	50 04 24.4	9.64	12.9	9.74	236.52	0.684
BRT 602	23 32 07.02	-14 31 33	10.8	11	4.87	120.27	0.684
BAL1249	23 41 02.65	00 43 06.9	10.36	12.4	12.67	330.93	0.684