

# CCD Astrometry of the Multiple Star System Beta 321 in Lepus

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**Abstract:** A program of student measurements of visual double stars was initiated at the Leeward Community College with CCD astrometry of the multiple star system Beta 321 in Lepus. Our measurements of the AC component indicated a separation of 89.3 arc seconds and a position angle of 135.5 degrees. We also measured the position angle and separation of three additional components.

In early February 2012, the authors initiated a program of visual double star astrometry at Leeward Community College (LCC). LCC is one of the seven community college campuses of the University of Hawai'i System. LCC has over 6200 students and is located to the west of Honolulu over looking Pearl Harbor about 50 feet above sea level.

The LCC Kilohoku Hale observatory (Figures 1 and 2) is equipped with an Optical Guidance Systems 0.5 meter  $f/8.2$  telescope and an Apogee Alta U6 CCD camera with 24 micron pixels. Our observations were made without any filter (clear). The camera was cooled to  $-20^{\circ}\text{C}$  to reduce electronic noise level.

The multiple star systems Beta 321 in Lepus (also known as HD 37624, HIP 26591, SAO 150650, and WDS 05393-1751) was chosen for our initial "learning" observation. Although the AB component was too close for us to resolve (just 0.4 arc seconds), we were able to obtain measurements of the AC, AE, AF and AG components. A 10 second image (Figure 3), obtained on the night of February 2, 2012, had enough stars for an astrometric solution, and we used this frame in our analysis even though the AB and DE components were overexposed.

CCD Soft V5 was used for our astrometric analysis. The astrometric solution included 19 stars. The very bright AB and DE components of Beta 321 were not included in the 19-star astrometric solution as their cores were overexposed.

The .fits image was printed, scanned as



Figure 1: The LCC observatory is not far from Pearl Harbor.

Study of a New CPM Pair 2Mass 01300483-2705191



Figure 2: Left to right: Rebecca Church, a student at LCC; Kakkala Mohanan, the astronomy instructor at LCC; and Russ Genet, a visiting astronomer from California.

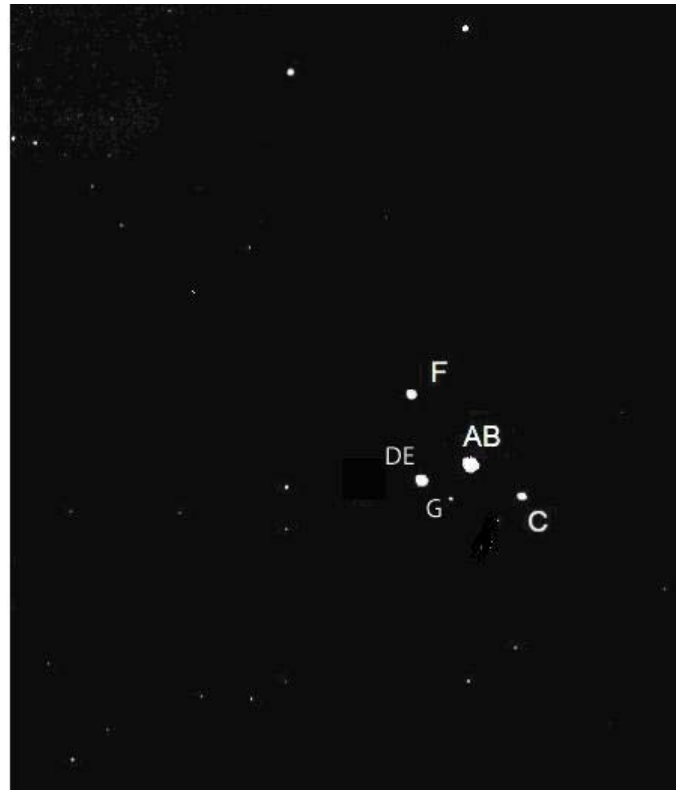


Figure 3: Image of Beta 321 in Lepus used in the analysis.

a .jpeg, and the contrast and brightness were adjusted. It was then pasted into Power Point for the addition of the labels, converted to a .pdf, and finally pasted into a word document. The astrometric solution gave the center of the image as RA 5h 39m 8.410s, and Dec -17d 50m 2.59s, with an image scale of 1.206 arc seconds/pixel and a camera position angle of 100.87 degrees from north.

CCD Soft has a feature (view cursor) that provides the separation and position angle on any two stars clicked in succession that were included in the astrometric solution. For stars not part of the astrometric solution, CCD soft calculates the centroid, although this calculation is not entirely repeatable. We compared our measurements with those reported by Sissy Haas (2006, *Double Stars for Small Telescopes*, Sky Publishing: Cambridge, MA).

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Wallen. This research has made use of the Washington Double Star Catalog maintained at the U.S. Naval Observatory.

Table 1: Our measurements of beta 321 as compared with those reported in Haas.

Star Pair	Our Sep (a.s.)	Haas Sep (a.s.)	Delta Sep (a.s.)	Our PA (deg.)	Haas PA (deg.)	Delta PA (deg.)
AC	89.3	89.9	0.6	136.5	138	1.5
AE	75.6	76.0	0.4	8.6	8	-0.6
AF	133.9	132.3	-1.6	299.5	299	-0.5
AG	59.6	N/A	N/A	50.7	N/A	N/A