Stellar density as a function of Galactic Latitude in the Milky Way Galaxy near Galactic Longitude 0.

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Abstract

This project studies on the stellar distribution of Milky Way galaxy. Starting from 7 September, 2012 to 15 January, 2013. The purpose is to study the star density per square arcmin near galactic longitude 0. The Research has found that the stellar density decrease as the galactic latitude increases, with the maximum stellar density at 23.3 stars per square arcmin around galactic latitude 10 degrees.

Introduction

Milky Way Galaxy is the galaxy that contains our solar system. We can see the Milky Way galaxy on the sky appears as a cloud of light. Milky Way galaxy contains hundreds of billions of Stars. And our solar system is one of them. A disk-shaped galaxy has varying stellar density according to galactic latitude. Milky Way galaxy is a spiral-barred galaxy and the arms extended from a central four arms.

Directly in the galactic plane are lane of dust and gas which can obscure light from stars. But if we look to the Scorpio and Sagittarius, Milky Way can be seen in the area, a vast and bright. This is because we are looking through the center of the galaxy.

Method

1. Determine the galactic longitude to study here is the galactic longitude 0, because it is the center of the galaxy. Then the data on the position group of stars. Convert the galactic coordinate system (Latitude, Longitude) to Equatorial coordinate system (RA, DEC). Divided by longitude at 0, 1, and the longitude 359 will shoot 13 shots. The latitudes are 30, 20, 10, 0, -10, -20, -30, -40, -50, -60, -70, -80 and -90 degrees.

2. Ordered PROMPT4, PROMPT5 telescopes in Chile (CTIO: Cerro Tololo Inter-American Observatory) with the field of view of 10 arcmin. Exposure for 120 seconds using R filter.

3. Prepare the images for counting stars.

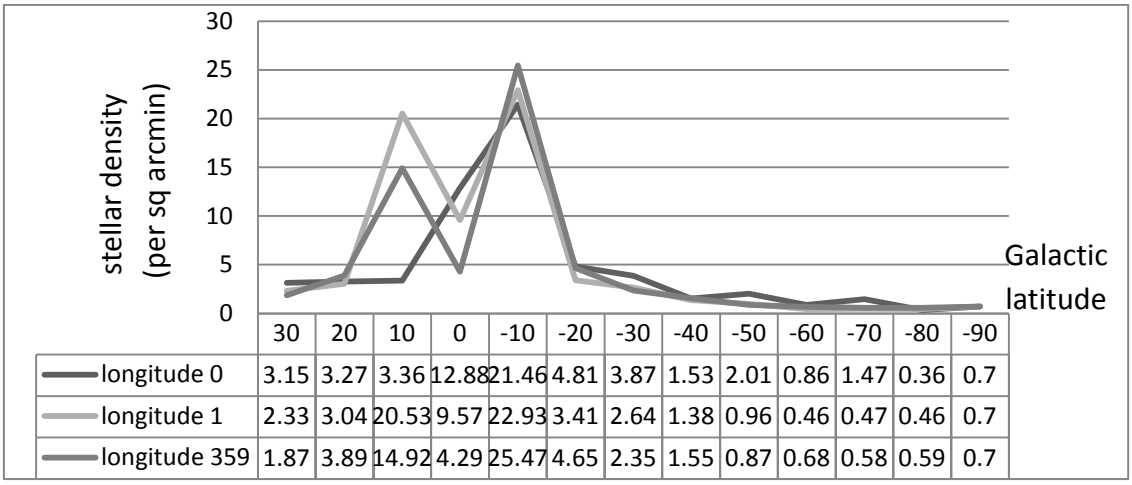
4. Make a table 100 channels on the transparency to facilitate and accuracy of information.

5. Determine the minimum brightness that can be observed in this study and define that to be the cutoff magnitude (maximum magnitude of stars that will be counted).

6. Count total number of stars brighter than the cutoff magnitude, divided by the area to calculate stellar density per square arcmin.

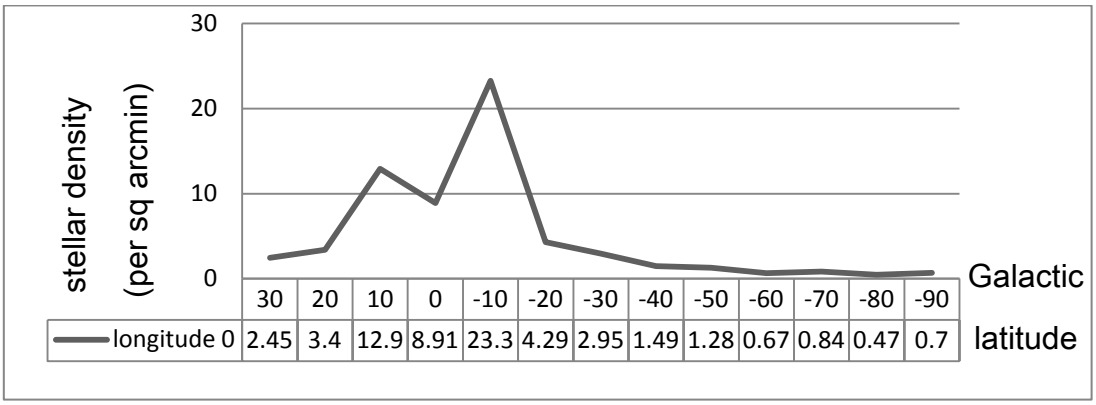
Result

The cutoff magnitude is set to be 17. The information is divided into the density of the number Stellar per square arc minute of longitude 359, 0 and 1 (Figure 1.) and an average density of Stellar per square arc minute of longitude 0 (Figure 2).



	30	20	10	0	-10	-20	-30	-40	-50	-60	-70	-80	-90
longitude 0	3.15	3.27	3.36	12.88	21.46	4.81	3.87	1.53	2.01	0.86	1.47	0.36	0.7
longitude 1	2.33	3.04	20.53	9.57	22.93	3.41	2.64	1.38	0.96	0.46	0.47	0.46	0.7
longitude 359	1.87	3.89	14.92	4.29	25.47	4.65	2.35	1.55	0.87	0.68	0.58	0.59	0.7

Figure 1, The density of Stellar per square arc minute of longitude 359, 0 and 1



	30	20	10	0	-10	-20	-30	-40	-50	-60	-70	-80	-90
longitude 0	2.45	3.4	12.9	8.91	23.3	4.29	2.95	1.49	1.28	0.67	0.84	0.47	0.7

Figure 2, An average density of Stellar per square arc minute of longitude 0

Discussions

Geometry of the spiral galaxy should suggest that stellar density should be highest near the galactic plane. However, due to dust band and gas that runs through the plane of Milky Way Galaxy, the brightness of stars decreases, also known as interstellar extinction. Data analysis on this research has shown that the central bulge of the galaxy should extend to around galactic latitude of 30 degrees, beyond which the stellar density decrease to almost constant when looking directly out of the galactic plane.

Conclusion

Study the star density per square arcmin near galactic longitude 0. The latitude is 30 to -90 degrees. The maximum stellar density is found to be at galactic latitude -10 with the average stellar density 23.3 stars per square arcmin.

Acknowledgement

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