Distribution and Kinematics of Cepheids in the Milky Way Galaxy

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This work aims to study the kinematic properties of the Galaxy. To do this, I consider classical Cepheids as test particles in the global velocity field. These high-luminosity stars are pulsating giants or supergiants with well-defined dependence between period and luminosity. Given the exact period, this dependence yields the absolute magnitude, and knowing the mean visual magnitude as well, we can determine the distance to a Cepheid. Using photometric catalogues and open sources of photometric data, I reclassified four Cepheids and corrected periods of 46 stars of more than 500 Cepheids listed in the General Catalogue of Variable Stars. In addition, I analyzed raw multicolor 2012-2014 observational data, including my own, of an ambiguously classified star V480 Aql, and identified it as a classical Cepheid. I calculated the distances to these Cepheids and plotted their 3D distribution. All of them appeared to belong to the thin Galactic disk. Taking into account the light absorption reduces the determined distances. Adding the information on radial velocities and proper motions of 202 Cepheids I determined their velocity vectors and plotted their projections on the Galactic plane. Their distribution and the mean rotation curve revealed the structure of the Galactic disk. I estimate that no more than 12.6% of Cepheids are available for observations in visual band. The distribution of Cepheids follows the spiral structure of the Galactic disk. The velocities of Cepheids are in good agreement with the rotation curves found in scholarly publications.

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