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The Outer Arm of the Milky Way from red clump stars

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Understanding the structure and formation of our Milky Way galaxy is one of the key goals in the field of Galactic astronomy. The study of disk morphology provides valuable insights into the processes that have shaped our galaxy over time. While our location within the disc allows for detailed observations of stars, this position also limits our ability to gain a clearer view of its structure. Many pioneering works have been done to understand the disc structure of our Galaxy. Currently, we know that our Galaxy has spiral arms but the finer details like the number of arms, their position, and extent are still uncertain. We carried out a systematic study to trace the structure of the Galactic disc from red clump (RC) stars, an indicator of the intermediate-to-old age population. The largest sample of red clump stars (~8.8 Million stars) is extracted utilizing the 2MASS and Gaia data in the Galactic disc covering $40^\circ \leq \ell \leq 340^\circ$ and $-10^\circ \leq b \leq +10^\circ$. Gaia Data plays a crucial role in selecting the pure RC sample by eliminating the foreground dwarf contamination. The resulting distribution of red clump stars in the Galactic plane detected the poorly constrained Outer arm of the Galaxy beyond the previous notion of its extent, providing new insights into the Galactic morphology. Our study also gave observational evidence of the warping of the spiral arms of the Galaxy as depicted by red clump stars.

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