A Runaway Star Candidate Selection and Analysis, Year Two

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Runaway star research, particularly hypervelocity stars, is a newer field in astronomy. It is important that more of these unique stars are identified and studied. In last year's research, a method to identify candidate runaway stars was developed using Gaia Space Observatory's newly released database. This year, it is hypothesized that smaller block size criteria will produce more accurate candidate selections. Second, it is hypothesized that if the reverse trajectories are calculated, the majority of the candidates selected will not show a supermassive blackhole origin. If a candidate is found to have an origin at the supermassive blackhole, that would be an indication the candidate is more specifically a hypervelocity star. The selection process developed last year, was applied using 3°, 5°, 7°, and 9° sky separation blocks. These four selections were cross-referenced against known databases to identify which selection had highest accuracy. Using the candidate selection determined most accurate, the true space velocities and origins were then calculated. Block size 5 detected the highest number of known "high velocity" stars. For the purpose of this project, block size 5 was selected for origin tracking. However, it is concluded that the first hypothesis requires further investigation and was neither supported nor refuted. None of the reverse trajectories of the block size 5 candidates showed indication of originating near the supermassive blackhole. The true space velocities of the candidates were also slower than a typical hypervelocity star’s velocity. It is concluded that the second hypothesis was supported.

Awards Won: