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Synthetic Populations of Ultra-Luminous X-ray Sources in Globular Clusters

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Ultra-Luminous X-ray Sources (ULXs), which emit more X-rays than typical accreting black holes, remain enigmatic objects in astrophysics. With only around 20 ULXs potentially residing in Globular Clusters (GCs), they pose challenging targets for study. Previous research predominantly focused on ULXs in the field, yet in the dense environment of GCs, where stars are densely packed, dynamics become crucial in ULX formation.

Through Markov Chain Monte Carlo (MCMC) simulations, we investigate how dynamics influence ULX formation. Our findings reveal that dynamics can both facilitate and hinder ULX formation processes. They can tighten star pairs or exchange partners, aiding ULX formation, but they can also disrupt the process. This results in inherently different ULX populations formed in GCs compared to those in the field, where specific populations can be distinguished. Furthermore, we analyze the ejection process from GCs, where ULXs formed in these environments can contribute to the populations in the field.

Our work contributes to a deeper understanding of these high-energy sources, highlighting the crucial role of dynamics in shaping their populations.

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