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Probing Intracluster Dynamics and Evolution of Globular Clusters through Cataclysmic Variable Populations

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This study examines how the dynamical interactions in globular clusters (GCs) influence the formation and evolution of binary sources like cataclysmic variables (CVs), focusing on their X-ray luminosity distributions. Using the MOCCA simulation tool, we classify simulated GCs into three evolutionary stages (Classes I, II, and III) and observe significant differences in CV X-ray luminosities across these classes. Additionally, we analyze 179 CV candidates in 18 GCs using data from the Chandra X-ray Observatory, categorizing these GCs into three dynamical age Families (I, II, and III) based on a pre-existing classification. Both simulation and observational data indicate that CVs in more dynamically mature clusters show higher X-ray emissions, suggesting that CVs, like blue stragglers, can reveal a GC's dynamical history. These findings shed light on the relationship between GC dynamics and the evolution of compact binaries.

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