
A New Perspective on the Color Distributions of Globular Cluster Systems in Early-type Galaxies

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One of the outstanding conundrums in extragalactic astronomy is the bimodality in color distribution of globular clusters in early-type galaxies. Here we find from the population synthesis technique that, along the relationship between intrinsic metallicity and its proxy, color, of old clusters, there is a critical point around which color becomes a factor of three more sensitive to metallicity. This causes a purely unimodal metallicity spread to be projected onto a color distribution with a deep concavity. Hence, an old cluster system with a metallicity spread is a sufficient condition for the curious color bimodality. The "projection effect" also explains the other relevant observations in a simple and cohesive way. The results firmly oppose the traditional view that ascribes the phenomenon to the presence of two discrete cluster sub-systems with distinct metallicity within individual galaxies.