Stellar Population Changes in Post-Core-Collapse Globular Clusters

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ABSTRACT. Color gradients, in the sense of becoming bluer inwards, are found in post-core-collapse (PCC) clusters. No gradients are seen in clusters with King-model morphology. The gradients seem to be caused by the demise of red giants and/or subgiants, and possibly an increased number of blue stragglers or some other population of faint, blue objects. Practically all PCC clusters have blue horizontal branches, with faint blue tails. Bright red giants are clearly underabundant in the central regions of PCC clusters, whereas HB stars seem to be unaffected. At a fixed metallicity, PCC clusters also show blue FUV colors, as seen in the archival data from the IUE and ANS (Figure 1). This is consistent with our observations of their HB morphologies, but a presence of an additional hot population cannot be excluded. The gradients may be a consequence of stellar interactions during and after the core collapse, and the mechanism may be important for the formation of millisecond and binary pulsars and LMXB's. These effects represent a strong evidence that dynamical evolution of star clusters can physically modify their stellar populations. It is possible that similar effects may operate in at least some galactic nuclei. More details and further references are given by Djorgovski et al. 1991, ApJ, 372, L41. S.D. acknowledges support from the NASA grant NAG5-1173 and the NSF PYI award AST-9157412.

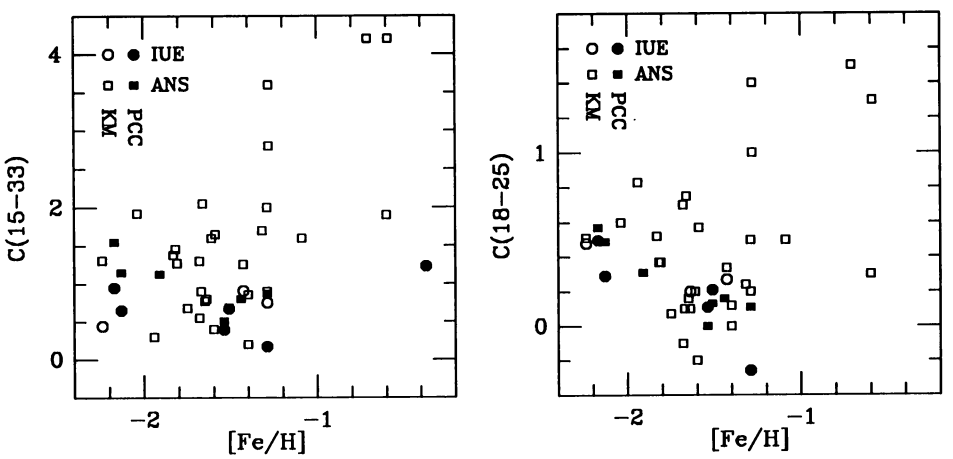

Figure 1: Extinction-corrected FUV colors of globular clusters measured with the IUE (circles) and ANS (squares), plotted vs. the metallicity. The solid symbols represent the PCC clusters, and the open symbols the clusters with the King model morphology. The cluster core structure appears to be at least as important as the metallicity in governing the UV colors, perhaps through the effect on the HB morphology.

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