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The metallicity distribution of bulge clump giants in Baade's Window

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(Submitted on 26 Jul 2011)

We seek to constrain the formation of the Galactic bulge by means of analysing the detailed chemical composition of a large sample of red clump stars in Baade's window. We measure [Fe/H] in a sample of 219 bulge red clump stars from R=20000 resolution spectra obtained with FLAMES/GIRAFFE at the VLT, using an automatic procedure, differentially to the metal-rich local reference star muLeo. For a subsample of 162 stars, we also derive [Mg/H] from spectral synthesis around the MgI triplet at 6319A. The Fe and Mg metallicity distributions are both asymmetric, with median values of +0.16 and +0.21 respectively. The iron distribution is clearly bimodal, as revealed both by a deconvolution (from observational errors) and a Gaussian decomposition. The decomposition of the observed Fe and Mg metallicity distributions into Gaussian components yields two populations of equal sizes (50% each): a metal-poor component centred around [Fe/H]=-0.30 and [Mg/H]=-0.06 with a large dispersion and a narrow metal-rich component centred around [Fe/H]=+0.32 and [Mg/H]=+0.35. The metal poor component shows high [Mg/Fe] ratios (around 0.3) whereas stars in the metal rich component are found to have near solar ratios. Babusiaux et al. (2010) also find kinematical differences between the two components: the metal poor component shows kinematics compatible with an old spheroid whereas the metal rich component is consistent with a population supporting a bar. In view of their chemical and kinematical properties, we suggest different formation scenarios for the two populations: a rapid formation timescale as an old spheroid for the metal poor component (old bulge) and for the metal rich component, a formation over a longer time scale driven by the evolution of the bar (pseudo-bulge).

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