ARE THE GALACTIC BULGE AND BAR THE SAME ?

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Abstract. An overview is given of the results obtained about Galactic Structure studies towards the Galactic Centre from star counts. The results indicate the presence of an old metal-rich population ($Z = 0.005 - 0.08$; $t = 13 - 15$ Gyr), presumably the old Galactic Bulge. In addition, a younger, less metal-rich population was found ($Z = 0.005 - 0.03$; $t = 8 - 9$ Gyr), likely related to the tri-axial bar found in other studies. In Baade's Window a ratio bulge/bar stars of approximately 1/2 was obtained from star counts.

1. Introduction

The stellar population synthesis technique is used to generate synthetic Hertzsprung-Russell diagrams (HRDs). This is a powerful tool in studies of the properties of resolved stellar populations. The so-called HRD galactic software telescope (HRD-GST) is developed to study the stellar populations in our Galaxy (Ng et al. 1995). The basis is formed by the latest evolutionary tracks calculated by the Padova group (Bertelli et al. 1994 and references cited therein). Through a galactic model synthetic Colour-Magnitude diagrams (CMDs) are generated and compared with the observations. The primary goal of the HRD-GST is to determine the interstellar extinction along the line of sight and to obtain constraints on the galactic structure and on the age-metallicity of the different stellar populations distinguished in our Galaxy. Thus far the distribution of the disc stars are described by a double exponential with a specific scale height and scale length for each subpopulation distinguished from differences in age and metallicity. The distribution of the halo/bulge/bar stars are well described with a power-law. One should bear in mind that the CMDs we studied are 'snapshots' from our Galaxy. We do not obtain from these diagrams information about

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the Galaxy's dynamical structure, because we lack the time resolution. The different stellar populations that we distinguish might therefore together form one dynamical entity. The results obtained thus far are reported in various papers (Bertelli et al. 1995, 1996; Ng et al. 1995 – 1997).

2. Bulge = Bar ?

In star counts studies with the HRD-GST one first has to determine the extinction along the line of sight (Bertelli et al. 1995, Ng & Bertelli 1996). In one of the fields studied by Bertelli et al. (1995, 1996) hot horizontal branch stars were found. The Padova isochrones, single stellar populations and synthetic stellar populations all indicated that these stars cannot be old and metal-poor, but are likely old and metal-rich (13 – 15 Gyr, Z up to 0.08). Ng et al. (1996) found from a study of the red horizontal branch morphology in Baade's Window the presence of a significant younger (8 – 9 Gyr) and less metal-rich ($Z = 0.005 - 0.03$) stellar population. The presence of an old, metal-rich population could not be excluded. However, no conclusive evidence was on the other hand found for its presence. The results thus far indicate that the stellar population constituting the galactic bulge and bar are likely not the same. In Baade's Window a stellar ratio bulge/bar = 1/2 was obtained. The star counts studies do not reveal if those stellar populations behave dynamically like one entity. This information should be obtained by other means. Future star counts studies with the HRD-GST ought to identify features in CMDs, which are indicative for different ages of metal-rich stellar populations. Furthermore, studies of large areas are required to obtain a statistically significant number of metal-rich, hot horizontal branch stars. The extinction ought to be studied carefully in order to disentangle metallicity from differential extinction and a detailed study should be made of the (de-reddened) red horizontal branch morphology. The availability of the OGLE-II data (http://www.astrouw.edu.pl/~ftp/ogle/index.html) satisfies the requirement for homogeneous photometry from large areas and further justifies a forthcoming effort to verify the star counts results. *Acknowledgements* Ng acknowledges financial support received from the IAU and the Italian Space Agency (ASI).

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