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MEASURING THE GALACTIC THICK DISK WITH QUEST-I RR LYRAE STARS

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RESUMEN

En esta contribución presentamos los resultados del sondeo QUEST de estrellas RR Lyrae del disco grueso. El sondeo abarca 480 grados cuadrados, a baja latitud galáctica $|b| < 30$ gds y distancias galactocéntricas entre 7 y 65 kpc; con observaciones multi-época en las bandas VRI, obtenidas con la cámara QUEST-I instalada en el telescopio Schmidt Jürgen Stock ubicado en el Observatorio Astronómico Nacional de Venezuela. A partir de los perfiles de densidad de RR Lyrae observados, derivamos para el disco grueso Galáctico una escala de longitud $h_R = 3.2 \pm 0.4$ kpc, escala de altura $h_Z = 0.94 \pm 0.15$ kpc y normalización $C_{\rm tk} = 15.9 \pm 2.6$ RRab/kpc^3. Adicionalmente encontramos evidencia del *flare* y antitruncamiento del perfil radial del disco grueso Galáctico.

ABSTRACT

In this contribution we present results for the QUEST RR Lyrae Survey of the thick disk. The survey spans 480 sq. deg. at low galactic latitudes $|b| < 30$ deg and galactocentric distances between 7 and 65 kpc, with multi-epoch VRI observations, obtained with the QUEST-I camera and the Jürgen Stock Schmidt telescope located at the National Astronomical Observatory of Venezuela. From the observed RR Lyrae density profiles, we derived a Galactic thick disk scale length $h_R = 3.2 \pm 0.4$ kpc, scale height $h_Z = 0.94 \pm 0.15$ kpc and normalization $C_{\rm tk} = 15.9 \pm 2.6$ RRab/kpc^3. We also find evidence of the thick disk being flared and having an anti-truncated radial profile.

Key Words: Galaxy: disk — Galaxy: stellar content — Galaxy: structure — stars: variables: other

1. INTRODUCTION

The thick disk of the Milky Way is widely recognized as a distinct component, having different kinematics, age and chemistry distinguishable from the thin disk and halo. In external galaxies, recent surveys have found thick disks to be an ubiquitous component, present in $> 90\%$ of disk galaxies. It is therefore crucial for galaxy formation models to reproduce the formation of this component and for observations to provide accurate measurements of Galactic and extra-galactic thick disks' structural, chemical and kinematic parameters to be compared with model predictions. In this contribution we present results for the QUEST RR Lyrae (RRL) Survey of the Galactic Thick Disk.

2. THE QUEST RR LYRAE SURVEY OF THE THICK DISK

The survey spans 480 sq. deg. at low galactic latitudes $|b| < 30$ deg, with multi-epoch observations for 6.45×10^6 objects in three optical photometric bands VRI, obtained with the QUEST-I camera and the Jürgen Stock Schmidt telescope located at the National Astronomical Observatory of Venezuela.

We identified 160 RRab and 51 RRc stars with completeness of 95% and 80% respectively. Distances were derived using individual reddenings computed for each RRab star from observed $V - R$ and $V - I$ colors at minimum light and intrinsinc colors from Guldenschuh et al. (2005) and Kunder et al. (2010). RRL stars from the Vivas et al. (2004) catalogue were included to supplement the survey at high latitudes.

3. MEAN DENSITY PROFILES

We computed the accumulated mean densities $\overline{\rho}_{\rm RR}(\leq R)$ and $\overline{\rho}_{\rm RR}(\leq z)$ of RRLs in the survey volume up to a projected galactocentric radius R and distance perpendicular to the Galactic Plane $|z|$ respectively, according to the following expressions

$$\overline{\rho}_{\rm RR}(\leq R) = V_S^{-1}{}_{(\leq {\rm R})} \iiint_{V_S(\leq R)} \rho(R', z')\ R' dR' dz' d\varphi\,, \quad (1)$$

$$\overline{\rho}_{\rm RR}(\leq |z|) = V_S^{-1}{}_{(\leq |{\rm z}|)} \iiint_{V_S(\leq |z|)} \rho(R', z')\ R' dR' dz' d\varphi\,, \quad (2)$$

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