

The Optical Gravitational Lensing Experiment: Analysis of the bulge RR Lyrae population from the OGLE-III data

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We have analyzed the data on 16,836 RR Lyrae (RR Lyr) variables observed toward the Galactic bulge during the third phase of the Optical Gravitational Lensing Experiment (OGLE-III), which took place in 2001-2009. Using these standard candles, we show that the ratio of total to selective extinction toward the bulge is given by $R_I = A_I/E(V-I) = 1.080 \pm 0.007$ and is independent of color. We demonstrate that the bulge RR Lyr stars form a metal-uniform population, slightly elongated in its inner part. The photometrically derived metallicity distribution is sharply peaked at $[Fe/H] = -1.02 \pm 0.18$, with a dispersion of 0.25 dex. In the inner regions ($|l| < 3$, $|b| < 4$) the RR Lyr tend to follow the barred distribution of the bulge red clump giants. The distance to the Milky Way center inferred from the bulge RR Lyr is $R_0 = 8.54 \pm 0.42$ kpc. We report a break in the mean density distribution at a distance of ~ 0.5 kpc from the center indicating its likely flattening. Using the OGLE-III data, we assess that $(4-7) \times 10^4$ type ab RR Lyr variables should be detected toward the bulge area of the on going near-IR VISTA Variables in the Via Lactea (VVV) survey, where the uncertainty partially results from the unknown RR Lyr spatial density distribution within 0.2 kpc from the Galactic center.

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