[구GC-01] HST/WFPC2 Imaging of the Dwarf Satellites And XI and And XIII : HB Morphology and RR Lyraes

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We present a comprehensive study of the stellar populations in two faint M31 dwarf satellites, And XI and And XIII. Using deep archival images from the Wide Field Planetary Camera 2 (WFPC2) onboard the Hubble Space Telepscope (HST), we characterize the horizontal branch (HB) morphologies and the RR Lyrae (RRL) populations of these two faint dwarf satellites. Our new template light curve fitting routine (RRFIT) detected RRL populations from both galaxies. The mean periods of RR_{ab} (RR0) stars in And XI and And XIII are $<P_{ab}>=0.621 \pm 0.040$, and $<P_{ab}> = 0.648 \pm 0.038$ respectively. Even though the RRL populations show a lack of RR_{ab} stars with high amplitudes (Amp(V) > 1.0 mag) and relatively short periods ($P_{ab} \sim 0.5$ days), their period - V band amplitude (P-Amp(V)) relations track the lower part of the general P-Amp(V) trend in the M31 outer halo RRL populations. The metallicities of RR_{ab} stars were calculated via the [Fe/H]-log P_{ab}-Amp(V) relationship of Alcock et al. The metallicities thus obtained ($[Fe/H]_{And\ XI}=-1.75$; $[Fe/H]_{And\ XIII}=-1.74$) are consistent with the values calculated from the RGB slope indicating that our measurements are not significantly affected by the evolutionary effects of RRL stars. We discuss the origins of And XI and And XIII based on a comparative analysis of the luminosity- metallicity (L-M) relation of Local Group dwarf galaxies.

[구GC-02] Mystery of the Most Isolated Globular Cluster in the Local Universe

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We present a discovery of two new globular clusters in the Hubble Space Telescope archive images of the M81 group. They are located much farther from both M81 and M82 in the sky, compared with previously known star clusters in these galaxies. Both clusters show that higher luminosity and larger effective radius than typical globular clusters in Milky Way and M81. Using the available spectroscopic data provided by the Sloan Digital Sky Survey, we derive a low metallicity with [Fe/H] ≈ -2.3 and an old age ~14 Gyr for GC-2. The I-band magnitude of the tip of the RGB for GC-1 is consistent with that of the halo stars in the GC-1 and GC-2 field. However, that of GC-2 is 0.26 mag fainter than its field. It shows that GC-2 is about 400 kpc behind the M81 halo along our line of sight. The deprojected distance to GC-2 from M81 is much larger than any other known globular clusters in the local universe. We discuss the possible scenarios to explain the existence of globular cluster in such an extremely isolated environment.