

**[GC-35] Photometric and Spectroscopic Morphology Classifications  
Using SDSS DR7 : Virgo Cluster**

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While the Virgo Cluster Catalog (VCC) is well established catalog from deep photographic plate survey, with available survey data recently released (e.g., SDSS), it can be further updated concerning the membership and morphology of galaxies. While membership and morphology of galaxies included in the VCC are based on the single band imaging data, thanks to the multi-color imaging and spectroscopic observations of SDSS, we are able to revise the membership and morphology of sample galaxies in the fields of the Virgo cluster. We present a new catalog of galaxies in the Virgo cluster using SDSS DR7 data, the extended Virgo cluster catalog. Using SDSS imaging and spectroscopic data, we introduce two kinds of galaxy classifications which are complementary each other. In addition to traditional morphological classification by visual inspection of the images ("Primary Classification"), we also attempt to classify galaxies with the spectroscopic features ("Secondary Classification"). The primary classification is basically based on the scheme of galaxy morphological classification of VCC. The secondary classification relies on the SED shape and presence of emission/absorption lines returned from SDSS. Our morphological classifications allow to study the evolution and associated star formation histories of galaxies in the Virgo cluster.

**[GC-36] The Dependence of Type Ia Supernovae Luminosities on the  
Morphologies of Host-Galaxies**

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The discovery of dark energy from Type Ia supernovae (SN Ia) is based on the implicit assumption that the look-back time evolution of SN Ia luminosity, after light-curve corrections, would be negligible. A strong support for this assumption was the apparent insensitivity of SN Ia distances across the host galaxy morphologies. However, Hicken et al. 2009 (H09) shows a systematic difference in the Hubble residual (HR) of  $0.144 \pm 0.070$  mag between the E-S0 and Scd/Sd/Irr galaxies, after light-curve corrections. If true, this indicates that the light-curve fitters used by the SN Ia community can not correct for the population age (and therefore the evolution) effect. In order to confirm this, we have combined nearby SN Ia samples and the first-year SDSS-II SN Survey. The SNANA package was used for analyzing SN Ia light-curve, both for the MLCS2k2 and SALT2 fitters. We find a systematic difference in the HR of  $0.10-0.13 \pm 0.030$  mag between E-S0 and Scd/Sd/Irr galaxies, which is in agreement with the result of H09, but now at the 3-5  $\sigma$  level. Considering the significant difference in the mean age of stellar population between these morphological types, the difference in the HR reported here suggests that the evolution effect of SN Ia luminosity should be considered in the cosmological application of SN Ia data.