[구GC-03] Color Gradients of Isolated Late-type Galaxies

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Radial color gradient of disk galaxies has been a key tool for diagnosing the ages and metallicities of the stars and gas of these galaxies, and thus, the formation process of these disks. In many cases, observational data support the 'inside-out' picture of disk galaxy formation proposed by Larson (1976). In this scenario, gas within dark matter halos cools and accretes on to the outer disk while enhancing star formation in the disk. Recent discoveries of "extended ultra-viloet" (XUV) disks also show that majority of disk galaxy experience active star formation within out disks where gas surface density is quite low (Thilker et al. 2007; Gil de Paz et al. 2007). However, neither gas, nor stars stay put within galaxies. They rather migrate into bulges, disperse throughout galaxies, or flow into and out of galaxies via various mechanisms. There have been a few notable studies to investigate how radial star formation and metal abundance gradients vary across populations of disk galaxies systematically. However, the mechanisms driving gas transport are still poorly understood.

Cross-matching various galaxy catalogs including KVAGC and UKIDSS, we are investigating if color gradients of late-type galaxies depend on their physical properties, especially on environmental properties. We will present the result from the pilot study on Karachentsev isolated galaxy catalog.

[구GC-04] GRB 100905A at the Epoch of Re-ionization

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Gamma Ray Bursts (GRBs) are the most energetic events in the universe, and are known to arise from the death of massive stars in many cases. Their extreme brightness makes it possible to detect them at very high redshift ($z > 6.5$), well into the epoch of re-ionization, providing us with an opportunity to investigate the deaths of the first stars when the universe was much younger than 1 Gyr. Here, we report the discovery of GRB 100905A, a GRB at $z \sim 7.5$ (age of the universe at 700 Myr). Our observation revealed a strong spectral break between z and J band, allowing us to estimate its photometric redshift. Its gamma-ray light curve shows a very short duration of about 0.7 sec, the shortest duration event at $z > 5$. Investigation of this and three other known GRBs at $z > 6.5$ reveals that they are all short duration bursts. This is puzzling, considering that GRBs from death of massive stars do not show short duration. We suggest two possible explanations for this: (i) the BAT light curves of the high redshift GRBs suffered from observational selection effect where we are only observing the very tip of the light curve; (ii) the stars in the early universe had a peculiar nature that are different from ordinary stars at lower redshifts.