simultaneously recorded with a single detector in a spectrograph. The instrument TIP (Tenerife Infrared Polarimeter) has been continuously operating since 1999 at the 70-cm German VTT of the Observatorio del Teide and has been recently moved to the 1.5-m German GREGOR. During all this time, results have been obtained concerning the nature of the weak photospheric magnetic field of the quiet sun, magneto-acoustic wave propagation, evolution with the cycle of sunspot magnetic fields, photospheric and chromospheric magnetic field in emerging regions, magnetic field in chromospheric structures such as filaments, prominences, flares, and spicules, etc. In this talk, I will review the main results obtained after all these observations and mention the main challenges for the future. With its novel polarization-free design and a complete suite of instruments aimed at simultaneous (imaging and spectroscopic) observations of the solar photosphere and chromosphere, the EST (European Solar Telescope) will represent a major world-wide infrastructure to understand the physical nature of all these phenomena.

[초 IT-05] 20 years of Bohyunsan Optical Astronomy Observatory (보현산천문대 20년)

Hyun-Il Sung
Korea Astronomy and Space Science Institute


[구 GC-01] Ten Years of Debate on the Origin of Globular Cluster Color Bimodality

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The globular cluster (GC) systems in most elliptical galaxies show bimodal color distributions. This phenomenon has been generally regarded as a bimodal metallicity distribution, indicating the presence of two sub-populations in a GC system. However, since a new explanation on the bimodality was introduced where the nonlinear metallicity-to-color conversion can cause bimodal color distributions, the origin of this phenomenon has been under hot debate. In this presentation, we briefly review the ten-year debate on the origin of GC color bimodality, and present our recent pieces of evidence on the nonlinear nature of GC color-metallicity relations.

[구 GC-02] Multiple stellar populations in the classical bulge

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The presence of multiple stellar populations is now well established in most globular clusters in the Milky Way. Here we show that two populations of RR Lyrae stars and the double red clump observed in the Milky Way bulge are another manifestations of the same multiple population phenomenon observed in halo globular clusters. We will discuss the implications of this result on the stellar populations and formation of early-type galaxies.

[구 GC-03] The Effect of Local–Global Environmental Bias on the Type Ia Supernova Host Galaxy Studies
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Recent studies suggest that the difference between global and local properties of galaxies (the local-global environmental (LoG) bias) might be important in the Type Ia supernova (SN Ia) host galaxy studies. Obtaining local spectroscopic properties of hosts at high redshift, however, is challenging. Here we will introduce a more efficient way to conduct this study by only using spectroscopy.

Virgo Cluster from Gemini GMOS long-slit early-type galaxies with blue-center in the sample to the hosts whose stellar mass is less than 10¹⁰ ⊙. We find that when we restrict a challenging. Here we will introduce a more efficient way to conduct this study by only using photometric data. We find that when we restrict a sample to the hosts whose stellar mass is less than 10¹⁰ ⊙, a sample without LoG bias is efficiently selected. From the sample without LoG bias, we confirm that SNe Ia in locally star-forming environment are 0.103 ± 0.010 mag and 0.085 ± 0.012 mag fainter than those in locally passive region, for MLCS2k2 and SALT2, respectively. Because of ~6 times larger sample that covers much wider redshift range, our results are far more significant statistically, 10.3σ for MLCS2k2 and 7.1σ for SALT2, than previous results.

[구 GC-05] Internal kinematics of dwarf early-type galaxies with blue-center in the Virgo Cluster from Gemini GMOS long-slit spectroscopy

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Dwarf elliptical galaxies (dEs), the most abundant galaxy type in clusters, were recently shown to exhibit a wide variety in their properties. Particularly, the presence of blue cores in some dEs, what we call dE(bc), supports the scenario of late-type galaxy infall and subsequent transformation into red, quiescent dEs. While several transformation mechanisms for these dE(bc)s within cluster environment have been proposed, all these processes are able to explain only some of the observational properties of dEs. In this context, internal kinematic properties of dE(bc)s provide the most crucial evidence to discriminate different processes for the formation of these galaxies. We present Gemini Multi Object Spectrograph (GMOS) long-slit spectroscopy of two dE(bc)s in the Virgo cluster. We obtained radial profiles of velocity and velocity dispersion out to ~1.3 effective radius. We found that two dE(bc)s exhibit kinematically decoupled components as well as distinct peculiar features in velocity profiles, supporting the scenario of mergers. We also found that these galaxies are structurally compatible with low surface brightness component of blue compact dwarf galaxies. We suggest that a part of dE(bc)s in the Virgo Cluster were formed through galaxy merger in low density environment such as galaxy group or outskirt of the cluster, and then were quenched by subsequent effects within cluster environment.

[구 GC-06] Optical properties of dwarf galaxies in Leo I galaxy group

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Since the serendipitous discovery of a large-scale atomic hydrogen (HI) ring discovered in the Leo I galaxy group, its origin has been under debate till today, whether it is the leftover after group formation or stripped gas structure during the galaxy-galaxy interaction. Intriguingly a number of HI clumps have been identified along the gas ring, some of which turn out to be associated with optically catalogued dwarf galaxies. The formation history based on detailed optical and HI gas properties of those dwarf galaxies will enable us to verify the origin of the Leo ring. In this work, we first probe the redshift and multi-color properties of those dwarf galaxies, using deep photometric and spectroscopic data from CFHT, Gemini and Magellan telescope.

[구 GC-07] Recent galaxy mergers and star formation history of red sequence galaxies in rich Abell clusters at z ≤ 0.1

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