sunspots by analyzing the motion of umbral flashes observed by the IRIS Mg II 2796Å slit-jaw images (SJI). The umbral flashes are believed as shock phenomena developed from upward propagating slow magnetohydrodynamic (MHD) waves. If the MHD waves are generated by convective motion below sunspots, the apparent origin of the umbral flashes known as oscillation center will indicate the horizontal position of convection cells. Thus, the distribution of the oscillation centers is useful to investigate the subsurface structure of sunspots. We analyze the spatial distribution of oscillation centers in the merged sunspot. As a result, we found that the oscillation centers distributed over the whole umbra regardless of the convergent interface between two merged sunspots. It implies that the subsurface structure of the sunspot is not much different from the convergent interface, and supports that many field-free gaps may exist below the umbra as the cluster model expected. For more concrete results, we should confirm that the oscillation centers determined by the umbral flashes accurately reflect the position of wave sources.

항성,항성계/외계행성

[포 SA-01] Current Status of Intensive Monitoring Survey of Nearby Galaxies and Core-Collapse Supernovae Observational Research

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Intensive Monitoring Survey of Nearby Galaxies (IMSNG) is a program monitoring nearby galaxies with a high cadence within a day. The main goal of the project is to constrain the SNe explosion mechanism and properties of their progenitors by catching the early lights from the shock-heated cooling emission. The observation campaign began in 2014 with two 1-m class telescopes in the northern hemisphere. Now more than ten telescopes are monitoring galaxies with 60 IMSNG targets, which have a high probability of supernova explosion every night all around the world. Since the project started, the following observations have been carried out on 14 SNe Ia(including -pec), 27 core-collapse supernovae (CCSNe), and around 40 transients in other types.

In this poster, we present the current status of IMSNG SNe data first and then focus more on the CCSNe. CCSNe are the explosion of massive stars, more massive than eight times of the Sun. They have been studied for more than a half decades but still have key questions to be solved, such as distinct types, the characteristics driving their diversity, and so on. Here, we show our ongoing studies of CCSNe in IMSNG, focusing on their usefulness as distance indicators and properties of early light curves.

[포 SA-02] Identifying clusters of red supergiants in Galactic plane using 2MASS and GAIA G band colors

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Galactic young massive clusters are the ideal laboratories to study massive stellar evolution. Unfortunately, such objects are rare. Of particular interest are so-called Red Supergiant Clusters (RSGCs) that are currently only found toward the Scutum-Crux Galactic arm. Confirming their nature as RSGC is often not straight-fortward as distinguishing RSGs from AGB stars is still difficult even with high spectral resolution spectra. Here we report that broad band colors using 2MASS JHK and GAIA G band data can be useful in reducing the AGB contamination, thus providing selection criteria that effectively reveal the known RSGCs with negligible false positives. On the other hand, we suggest that RSGC4, one of the proposed RSGC candidates, may not be a cluster of RSGs as their colors are not compatible with our selection criteria. We discuss the nature of these stars together with our IGRINS spectroscopic observations. We also employ the same selection criteria to search for RSGC candidates in other parts of the plane, resulting in no prominent candidates.

[포 SA-03] Pushing precision and accuracy of RR Lyrae variables as distance indicators

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RR Lyrae variables are excellent distance indicators thanks to their visual magnitude-metallicity relation and well-defined Period-Luminosity Relations (PLRs) at infrared wavelengths. These population II variables together with the tip of the red giant branch provide primary calibration for the first-rung of the population II distance ladder. We will present new empirical calibration of RR Lyrae PLRs at