

10 core-collapse supernovae in the near-infrared and visible wavebands. Our infrared data is from observations of the supernovae using the Wide Field Infrared Camera at the Palomar 5-m telescope as part of the Caltech Core-Collapse Supernova Program, while we obtain the visible data from publicly available data base. By fitting the broadband spectral energy distribution with a black body and, when necessary, modified black body component, we estimate physical parameters of the supernovae more accurately and also conduct a systematic investigation of when the supernovae show any indication of dust formation.

[7 ST-07] Time monitoring observations of H₂O and SiO masers toward semi-regular variable star R Crateris

Dong-Jin Kim^{1,2}, Se-Hyung Cho², Young-Joo Yun², JaeHeon Kim², Yoon Kyung Choi², Dong-Whan Yoon², Suk-Jin Yoon¹

¹*Department of Astronomy, Yonsei University,*

²*Korea Astronomy and Space Science Institute*

With the Korean VLBI Network (KVN), both single dish and VLBI monitoring observations of H₂O and SiO masers were performed toward the semi-regular variable star R Crateris. In the case of 11 VLBI monitoring observations from Jan. 5, 2014 to Jan. 7, 2016, successful superposed maps of H₂O and SiO masers were obtained at 7 epochs by adopting the Source Frequency Phase Referencing (SFPR) method. These results enable us to investigate the development of outflow and asymmetric motions from SiO maser to H₂O maser regions according to stellar pulsation which are closely related with a mass-loss process. Single dish monitoring observations of H₂O and SiO masers were also carried out from 2009 June to 2016 Feb. Intensity variations between H₂O and SiO masers were investigated according to stellar optical phases together with peak velocity variations with respect to the stellar velocity. We will compare the VLBI results among different maser transitions with those of single dish.

[7 ST-08] Calibrator Survey for evolved stars using the KVN

Yoon Kyung Choi, Jan Wagner, Taehyun Jung, Youngjoo Yun, and Se-Hyung Cho
Korea Astronomy and Space Science Institute

We present results of a calibrator search near twenty evolved stars using the Korean VLBI

Network (KVN). Our evolved star targets include candidate sources for a Key Science Project (KSP) of the KVN. The KSP plans to investigate the spatial structure and dynamical effects between SiO and H₂O maser regions including mass-loss process and development of asymmetry in circumstellar envelopes of evolved stars. For these purposes, we need compact and strong extragalactic sources close to the evolved stars. We carried out 5 observations in order to detect radio continuum sources that can be used for source frequency phase-referencing (SFPR) -based analysis. We observed 153 sources, out of which we detected 29 at 22 GHz and 20 at 43 GHz at signal-to-noise ratios higher than 50 at all baselines. Therefore, we successfully found target and calibrator pairs for the KVN KSP.

[7 ST-09] Radial distribution of RGB stars in the Globular Clusters with multiple stellar populations

Dongwook Lim¹, Young-Wook Lee¹, Sang-Il Han², Dong-Goo Roh²

¹*Center for Galaxy Evolution Research & Department of Astronomy, Yonsei University*

²*Korea Astronomy and Space Science Institute*

Most globular clusters are now known to have two or more stellar populations with different chemical properties. In order to understand the origin and evolution of multiple stellar populations in these globular clusters, it is necessary to study not only the chemical property, but also the dynamical property. In our previous works (Lim et al. 2015; Han et al. 2015), we have shown that Ca narrow-band photometry can be combined with low-resolution spectroscopy to effectively study the chemical properties of globular clusters. In this talk, we will show our observations are also useful to study the radial distribution of stars in globular clusters with multiple stellar populations, and report our preliminary results.

[7 ST-10] Spectroscopic study of Planetary hosting star HD 20794

Pakakaew Rittipruk, Alexander V. Yushchenko, and Young-Woon Kang

Department of Astronomy and Space Science, Sejong University, Seoul, Republic of Korea

We observed the high resolution spectra of a solar-neighborhood planetary hosting star HD 20794. The analysis of spectroscopic data was