to 0.9 depending on the supernova explosion frequency and the evolution model, has been calculated from the O VI and C IV maps. The hot gas generation models has been verified from the global distribution of O VI and C IV emissions, and a new complementary model has been proposed in this study.

[구 IM-03] Unbiased spectroscopic study of the Cygnus Loop with LAMOST

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We present a spectroscopic study of the Galactic supernova remnant (SNR) Cygnus Loop using the fifth Data Release (DR5) of LAMOST. The LAMOST (Large Sky Area Multi-Object Fiber Spectroscopic Telescope) features both a large field-of-view (about 20 deg2) and a large aperture (~4 m in diameter), which allow us to obtain 4000 spectra simultaneously. Its wavelength coverage ranges from ~3700Å to 9000Å with a spectral resolution of R≈1800. The Cygnus Loop is a prototype of middle-aged SNRs, which has advantages of being bright, large in angular size (~3.8˚x3˚), and relatively unobscured by dust. Along the line of sight of the Cygnus Loop, 2747 LAMOST DR5 spectra are found in total, which are spatially distributed over the entire remnant. Among them, 778 spectra are selected based on the presence of emission lines (i.e., [O III]λ5007, Ha, and [S II]λλ 6717, 6731) for further visual inspection. About half of them (336 spectra) show clear spectral features to confirm their association with the remnant, 370 spectra show stellar features only, and 72 spectra are ambiguous and need further investigation. For those associated with the remnant, we identify emission lines and measure their intensities. Spectral properties considerably vary within the remnant, and we compare them with theoretical models to derive physical properties of the SNR such as electron density and temperature, and shock velocity. While some line ratios are in good agreement with model prediction, others cannot be explained by simple shock models with a range of shock velocities. We discuss these discrepancies between model predictions and the observations and finally highlight the powerfulness of the LAMOST data to investigate spatial variations of physical properties of the Cygnus Loop.

[구 IM-04] Internal structure of a massive star-forming region G33.92+0.11 revealed by the high resolution ALMA observations

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G33.92+0.11, classified as a core-halo UC HII region at a distance of 7.1 kpc, contains several sub-clumps (~20-200 solar masses) as identified by dust continuum emission. This source shows very complicated features associated with vigorous massive star-forming activities with a nearly face-on projection. The ambient gas is still accreting to the massive molecular clumps dynamically, while the whole cloud is under disruption by newly formed stars. Using the recent high resolution (< 0.2") ALMA observations, we investigate the detailed structure associated with the star-forming activities by comparing different chemical tracers. The sub-clumps having extremely complex morphologies still preserve cold dense gas together with the turbulent and dense warm gas resulted by newly formed stars and interaction with accreting gas. The accretion of the ambient gas may have occurred episodically to this source. Most recent star formation, which probably the third generation of star formation in this region, is taking place in the northern part (A5 clump). The relatively small mass (~ 1/3 of A1 or A2) and the lack of turbulent gas of this star-forming core may suggest that this core was formed already during the overall collapse of the whole cloud for the first star formation. We think that gravitational collapse of these sub-clumps appears as sequential star formation of this region. The later interaction with accreting gas may have not been a direct cause of the star formation activities of this source.

[구 IM-05] Magnetic Fields of the Youngest Protostellar System L1448 IRS 2 revealed by ALMA

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Magnetic fields affect star formation in a broad range of scales from parsec to hundreds au. In particular, interferometric observations and ideal magneto-hydrodynamic (MHD) simulations have