[구IM-05] Statistical Analysis of the HI Structure in Our Galaxy

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We analyze the I-GALFA HI 21-cm line survey data in order to study the characteristics of interstellar turbulence in the neutral hydrogen medium in the Galaxy. We select several regions of 4.3 deg x 4.3 deg area near or far from the galactic plane both in the inner and outer Galaxy, transform the power of those regions into Fourier planes and derive one- and two-dimensional power spectra of HI emission. Our Fourier-analysis shows that the iso-power contours generally elongate along the latitude direction more in the outermost spiral arm, which indicates that the HI structure is "filamentary" and mainly aligned along the longitude. At high latitudes or in the interarm region, on the other hand, the iso-power contours are close to circles implying that the HI structures are randomly distributed or "clumpy". In the inner Galaxy, we derive two-dimensional spectra both far from and near the arm and explore the nature of the turbulence.

[구IM-06] SNR 0104-72.3: A remnant of Type Ia Supernova in a Star-forming region?

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We report our 110 ks Chandra observations of the supernova remnant (SNR) 0104-72.3 in the Small Magellanic Cloud (SMC). The X-ray morphology shows two prominent lobes along the northwest-southeast direction and a soft faint arc in the east. Previous low resolution X-ray images attributed the unresolved emission from the southeastern lobe to a Be/X-ray star. Our high resolution Chandra data clearly shows that this emission is diffuse, shock-heated plasma, with negligible X-ray emission from the Be star. The eastern arc is positionally coincident with a filament seen in optical and infrared observations. Its X-ray spectrum is well fit by plasma of normal SMC abundances, suggesting that it is from shocked ambient gas. The X-ray spectra of the lobes show overabundant Fe, which is interpreted as emission from the reverse-shocked Fe-rich ejecta. The overall spectral characteristics of the lobes and the arc are similar to those of Type Ia SNRs, and we propose that SNR 0104-72.3 is the first case for a robust candidate Type Ia SNR in the SMC. On the other hand, the remnant appears to be interacting with dense clouds toward the east and to be associated with a nearby star-forming region. These features are unusual for a standard Type Ia SNR. Our results suggest an intriguing possibility that the progenitor of SNR 0104-72.3 might have been a white dwarf of a relatively young population.