density or opening angle and compare with those from previous studies based on other wavelengths (e.g. Infrared or X-ray).

이론/고에너지/고천문학

[박 HA-01] Diffusion of Cosmic Rays in a Multiphase Interstellar Medium Shocked by a Supernova Remnant Blast Wave

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Supernova remnants (SNRs) are one of the most energetic astrophysical events and are thought to be the dominant source of Galactic cosmic rays (CRs). A recent report on observations of gamma rays from the vicinity of SNRs have shown strong evidence that Galactic CR protons are accelerated by the shock waves of the SNRs. The actual gamma-ray emission from pion decay should depend on the diffusion of CRs in the interstellar medium. In order to quantitatively analyze the diffusion of high-energy CRs from acceleration sites, we have performed test particle numerical simulations of CR protons using a three-dimensional magnetohydrodynamics (MHD) simulation of an interstellar medium swept-up by a blast wave. We analyse the CRs diffusion at a length scale of order a few pc, and show the Richtmeyer-Meshkov instability can provide enough turbulence downstream of the shock to make the diffusion coefficient close to the Bohm level for energy larger than 30 TeV for a realistic interstellar medium.

[구 HA-02] Toward the Development of a New MHD Code for Fusion Plasma

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Development of a new code for magnetohydrodynamic (MHD) phenomena in fusion plasma is under progress through a collaboration between plasma physicists, mathematicians, and astrophysicists. The code employs approaches different from those of existing codes. For instance, it is based on a finite difference scheme of high-order and high accuracy, complying conservation laws. The new code will have characteristics distinguished from those of commonly used code such as M3D and NIMROD. Here we will report the progress of the code development.

[구 HA-03] Influence of the Galactic Magnetic Field on the Distribution of Ultra-high-Energy Cosmic Rays

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Recently, the Pierre Auger Observatory (PAO), the largest ground-based project for detecting ultra-high-energy cosmic rays (UHECRs), published their 10-year data. We can access an unprecedented number of UHECR data observed by the project, which give us a possibility to get an accurate statistical test result. In this work, we investigate the influence of the galactic magnetic field (GMF) on the distribution of UHECRs by searching the correlation with the large-scale structure (LSS) of the universe. We simulate the mock UHECR events whose trajectories from the sources would be deflected by the Gaussian smearing angle which reflects the influence by the GMF. By the statistical test, we compare the correlation between the expected/observed distribution of UHECRs and the LSS of the universe in the regions of sky divided by the galactic latitude, varying the smearing angle. Here, we assume the deflections by the GMF are mainly dependent on the galactic latitude. Using the maximum likelihood estimation, we find the best-fit smearing angle in each region. If we get a trend that best-fit smearing angles differ from each region, the influence of GMF may be stronger than that of intergalactic magnetic fields (IGMF) because it is known that the distribution of IGMF follows the LSS of the universe. Also, we can estimate the strength of the GMF using the best-fit parameter by the maximum likelihood.

[구 HA-04] KaVA Q-band Monitoring of Sgr A* in 2013-2014

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