Contribution ID: **67** Type: **poster**

Detection of Diffuse γ-Ray Emission toward a Massive Star-forming Region Hosting Wolf–Rayet Stars

Isotopic and elemental abundances seen in Galactic cosmic rays (GCRs) imply that ~20% of the cosmic-ray (CR) nuclei are probably synthesized by massive Wolf–Rayet (W-R) stars. Massive star clusters hosting W-R- and OBtype stars have been proposed as potential GCR accelerators for decades, in particular via diffusive shock acceleration at wind termination shocks. Here we report the analysis of Fermi Large Area Telescope data toward the direction of Masgomas-6a, a young massive star cluster candidate hosting two W-R stars. We detect an extended γ-ray source with a test statistic = 183 in the vicinity of Masgomas-6a, spatially coincident with two unassociated Fermi 4FGL sources. We also present the CO observational results of molecular clouds in this region, using the data from the Milky Way Imaging Scroll Painting project. The γ-ray emission intensity correlates well with the distribution of molecular gas at the distance of Masgomas-6a, indicating that these γ-rays may be produced by CRs accelerated by massive stars in Masgomas-6a. At the distance of 3.9 kpc of Masgomas-6a, the luminosity of the extended source is (1.81 ± 0.02) × 1035 erg s−1. With a kinetic luminosity of ~1037 erg s−1 in the stellar winds, the W-R stars are capable of powering the γ-ray emission via neutral pion decay resulted from CR proton–proton interactions. The size of the GeV source and the energetic requirement suggests a CR diffusion coefficient smaller than that in the Galactic interstellar medium, indicating a strong suppression of CR diffusion in the molecular cloud.

Summary

Primary author: WANG, Kai (Nanjing University)

Presenter: WANG, Kai (Nanjing University)