CONSTRAINING THE FLUX OF LOW-ENERGY COSMIC RAYS ACCELERATED BY THE SUPERNOVA REMNANT IC 443

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It has long been theorized that supernova remnants (SNR) accelerate the majority of Galactic cosmic rays. Observations in the γ-ray, X-ray, and radio regimes support this theory, at least for cosmic rays with energies above a few GeV. However, there is no direct evidence that SNRs accelerate cosmic rays in the MeV–GeV range. These low-energy cosmic rays are of great importance, as they are the primary means by which H_2 is ionized in the interstellar medium. Collisions between H_2^+ and H_2 will rapidly form H_3^+, a molecule which can then be observed to infer the ionization rate of H_2. Using the Subaru and Keck telescopes, we have searched for H_3^+ absorption in sight lines which probe molecular material known to be interacting with the SNR IC 443. By computing the ionization rate of H_2 in these sight lines, we constrain the flux of low-energy cosmic rays generated by this particular supernova remnant.