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Cosmic Rays and the Production of Lithium in the Small Magellanic Cloud

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Lithium is one of the few elements produced in the Big Bang Nucleosynthesis (BBN), but it is the only one with the expected primordial abundances that do not match the observed values measured in low-metallicity environments, like in the Milky Way halo stars. Recently, the first lithium detection outside of the Milky Way was made in the low-
metallicity gas of the Small Magellanic Cloud. These abundances are in fact much higher than in the Milky Way halo stars, and are at the level of the expected primordial value. After BBN, lithium is produced in cosmic-ray interactions. Any measured lithium abundance therefor contains at least some post-BBN produced lithium. Cosmic-ray collisions with atoms in the interstellar medium that can produce lithium can also produce gamma-rays, through production of neutral pions and their subsequent decay. In Ciprijanovic (2016) we use the Small Magellanic Cloud gamma-ray observations by Fermi-LAT in order to calculate the abundance of lithium that was produced by galactic cosmic rays in this galaxy. We find that cosmic rays accelerated in supernova remnants inside this galaxy can account for only a small amount of lithium, less than 1% of the observed abundance. The observed lithium abundance that is inconsistent with expected star-formation history of the SMC might indicate that another production channel of lithium was dominant in the SMC, or a more interesting history.

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