Galactic Interactions: New Source of Lithium?

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Given the persisting problem of matching the primordial lithium abundance predictions with abundances observed in low-metallicity systems, it is important to account for all possible sources and sink of lithium, especially at early epochs. We investigate the impact of close galactic fly-bys on lithium nucleosynthesis through interactions of cosmic rays, additional to standard galactic cosmic rays, which get accelerated in large-scale tidal shocks that arise in galactic interactions. This is important for low-metallicity systems, especially if such system is a smaller of the two interacting objects. For our test casewe pick Small Magellanic Cloud(SMC)which has experienced few close interactions with neighboring galaxies. We show that only a few close galactic fly-bys would be sufficient to significantly (at the level oflithium abundance produced in standard galactic cosmic-ray nucleosythesis) contaminate the SMC gas with extra lithium made in tidal cosmic-ray interactions. This is especially important in the light of the recent first gas-phase measurement of lithium in the SMC, which serves to test the nature of the primordial lithium problem. Our results indicated that the problem with lithium persists even in the gas-phase low-metallicity environment suchis the SMC, and that its solution should be sought in the form of the new physics.