Abstract Submitted
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Hoyle reloaded: a nuclear fix to the cosmological lithium abundance? RICHARD CYBURT, JINA/MSU — There is a significant discrepancy between the current theoretical prediction of the cosmological lithium abundance, produced as Be7 during the Big Bang, and its observationally inferred value. We investigate whether the resonant enhancement of Be7 burning reactions may alleviate this discrepancy. We identify one narrow nuclear level in B9, E(5/2+)$\sim$16.7 MeV that is not sufficiently studied experimentally, and being just $\sim$200 keV above the Be7+d threshold, may lead to the resonant enhancement of Be7(d,gamma)B9 and Be7(d,pa)He4 reactions. We determine the relationship between the domain of resonant energies Er and the deuterium separation width Gamma(d) that results in the significant depletion of the cosmological lithium abundance and find that Er, Gamma(d)$\sim$(170-220,10-40) keV can eliminate current discrepancy. Such a large width at this resonant energy can be only achieved if the interaction radius for the deuterium entrance channel is very large, a>9 fm. Our results also imply that until dedicated nuclear experimental work is done to clarify the role played by this resonance, the current conservative BBN prediction of lithium abundance should carry significantly larger error bars, [Li7/H]=(2.5-6.0)E-10.

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