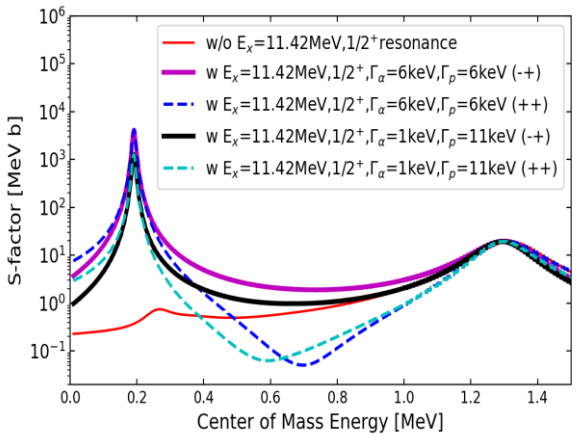
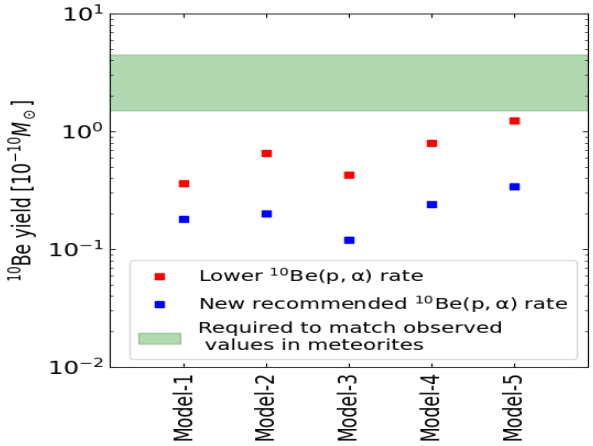
New ^{10}Be(p,α)^{7}Li reaction rate and implications for the formation of Solar System





The presence of specific short-lived radionuclides in meteorite samples suggests that the formation of our Solar System was triggered by a nearby supernova explosion. A recent study showed that low-mass supernovae can produce ^{10}Be at a level compatible with meteorite data. However, the ^{10}Be yield in supernovae is highly sensitive to the ^{10}Be(p,α)^{7}Li destruction reaction. We studied the impact of this reaction on the ^{10}Be yield from supernovae considering a recently observed near-threshold resonance in ^{11}B. We showed that this resonance is the most important resonance in the Gamow window, which makes the ^{10}Be(p,α) reaction rate several orders of magnitude higher than without this resonance. With this new rate, supernovae models cannot produce ^{10}Be in sufficient quantities to explain the observed abundance in meteorites, even when considering a wide range of neutrino models. These new findings point to other possible origins of ^{10}Be in the early Solar System.

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