The $^3$He($\alpha,\gamma$)$^7$Be reaction rate, solar $^7$Be and $^8$B neutrino fluxes, and the production of $^7$Li during the Big Bang

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The $^3$He($\alpha,\gamma$)$^7$Be reaction plays an important role both in determining the predicted fluxes of $^7$Be and $^8$B neutrinos from our Sun, and in the calculation of primordial $^7$Li production. In light of the highly precise determination of the baryon-to-photon ratio from the cosmic microwave background data [1], it is necessary to re-determine primordial $^7$Li production.

Recent experimental nuclear astrophysics work has led to an improved determination of the $^3$He($\alpha,\gamma$)$^7$Be cross section, with several experiments clustered at $E = 0.5$ MeV center-of-mass energy and above [2, and references therein]. On the other hand, precisely calibrated $^7$Be and $^8$B neutrino fluxes from the Sun are now available [3, 4]. Assuming the accepted solar central temperature to be correct, the neutrino flux data can be used to determine the $^3$He($\alpha,\gamma$)$^7$Be cross section [5] at the solar Gamow peak, $E = 0.03$ MeV.

The energy range relevant for Big Bang $^7$Li production lies just between 0.03 and 0.5 MeV. The poster aims to use the two above described levels in order to improve the precision of the predicted primordial abundance of $^7$Li. It updates a previous work [6] that appeared before the new cross section, solar neutrino and microwave background data were available.