

# ${}^7\text{Be}(n,p)$ cross section measurement for the Cosmological Lithium Problem at the n\_TOF facility at CERN

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Big Bang Nucleosynthesis (BBN) theory predicts the abundances of the light elements D,  ${}^3\text{He}$ ,  ${}^4\text{He}$  and  ${}^7\text{Li}$  produced in the early universe. The primordial abundances of D,  ${}^3\text{He}$  and  ${}^4\text{He}$  inferred from observational data are in good agreement with predictions, however, the BBN theory overestimates the primordial  ${}^7\text{Li}$  abundance by about a factor of three with respect to the observations in metal poor halo stars [1]. This discrepancy is known as Cosmological Lithium Problem (CLiP). Since primordial  ${}^7\text{Li}$  is produced mainly by the decay of  ${}^7\text{Be}$ , reducing the amount of  ${}^7\text{Be}$  surviving the BBN phase, reduces the primordial  ${}^7\text{Li}$ . The two principal reactions responsible of the destruction of  ${}^7\text{Be}$  via neutron reactions are: the  ${}^7\text{Be}(n,p){}^7\text{Li}$ , providing 97% destruction of  ${}^7\text{Be}$  and the  ${}^7\text{Be}(n,\alpha){}^4\text{He}$ , responsible of 2.5%. The  $(n,\alpha)$  reaction has already been studied at the n\_TOF facility at CERN, where its cross section has been found too low to solve the CLiP [2]. Various measurements have excluded also a significant effect on the CLiP of charged particle induced reactions on  ${}^7\text{Be}$ , so the only possibility left to find a Nuclear physics solution to the problem is the  $(n,p)$  reaction. Despite the importance of this reaction in BBN, there is a lack of cross section data. Taking advantage of the innovative features of the second experimental area at n\_TOF facility at CERN [3][4], e.g. the very high instantaneous flux, the wide energy range and the low background conditions, an accurate measurement of  ${}^7\text{Be}(n,p){}^7\text{Li}$  cross section has been recently performed at n\_TOF with a pure  ${}^7\text{Be}$  target produced by implantation of a  ${}^7\text{Be}$  beam at ISOLDE. The experimental procedure, the set-up used in the measurement and the results will be presented in this talk.

## References

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