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Production and characterization of 7Be targets

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This contribution presents the separation of 7Be from the cooling water of the Spallation Neutron Source at the Paul Scherrer Institut, Switzerland, followed by the preparation and characterization of 7Be targets. These targets were used in two independent and successful experiments at n_TOF-CERN and at SARAF facilities for the measurement of the 7Be(n,α)4He cross section in the energy range of interest for the Big-Bang nucleosynthesis. The results of these experiments are going to be used for solving or partially mitigate the long lasting "Cosmological Lithium problem".
The high specific activity of 7Be and the necessity of producing very thin targets, to be able to detect the outgoing alpha particles, were the main challenges of this project. The first imposed to work in hot cell, while the second was overtook using two different deposition methods: molecular plating onto thin aluminium backings and vaporization of 7Be(NO3)2 droplets precisely positioned onto a stretched low density polyethylene film. The thickness and the uniformity of the obtained targets were characterized by measuring the energy degradation of 5.5 MeV alpha particles passing through them. The results show the obtainment of very thin but not uniform targets when using the vaporization method, conversely, uniform but significantly thicker targets were obtained by molecular plating.

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