

**LABORATORI NAZIONALI DEL GRAN SASSO**

**SEMINAR ANNOUNCEMENT**

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***“The  $2\text{H}(\alpha,\gamma)6\text{Li}$  reaction measurement at LUNA”***

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*The  $2\text{H}(\alpha,\gamma)6\text{Li}$  reaction represents the main  $6\text{Li}$  production reaction in the Big Bang Nucleosynthesis (BBN). It has been experimentally studied only for energies greater than 1 MeV and around the 711 keV resonance, while it has never been measured in the BBN region of interest ( $30\text{ keV} < E < 400\text{ keV}$ ). Moreover, theoretical estimates of the reaction probability in the region of interest show differences of 1-2 orders of magnitude. Therefore, a direct measurement of  $2\text{H}(\alpha,\gamma)6\text{Li}$  reaction at low energy is of primary importance to get a reliable estimate of the standard BBN production of  $6\text{Li}$ . This measurement can be performed at LUNA using an alpha beam, a deuterium gas-target and a HPGe detector (135% efficiency) mounted in close geometry. The  $2\text{H}(\alpha,\alpha)2\text{H}$  Rutherford scattering is a side effect that has to be dealt with. It induces the  $2\text{H}(2\text{H},n)3\text{He}$  and  $2\text{H}(2\text{H},p)t$  reactions. The neutrons produced by the  $2\text{H}(2\text{H},n)3\text{He}$  reaction with a maximum energy of 3.4 MeV are in principle a background source for other experiments operating at LNGS. An experimental set-up, designed to minimize the neutron production rate, was built. This includes a shielding around the reaction chamber based on borated polyethylene. The experimental apparatus has already been tested showing perfect agreement with calculations on neutron production. Moreover, the impact of the measurement on other experiments has been evaluated on the basis of the LNGS underground map. The results of the test and the measurement strategy will be presented.*

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