

## Direct $^{13}\text{C}(\alpha, n)^{16}\text{O}$ cross section measurement at low energies

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The reaction  $^{13}\text{C}(\alpha, n)^{16}\text{O}$  is the main neutron source in the “s process”, which is responsible for the production of about half of the heavy elements in the universe. It operates in thermally pulsing low mass AGB stars at temperatures of about 90 MK. This translates to a Gamow window between  $\approx 140 - 230$  keV, far below the Coulomb barrier. Various measurements of the low energy cross section of  $^{13}\text{C}(\alpha, n)^{16}\text{O}$  have been performed in the past, and while remarkable results have been achieved, ultimately they environmental background on the surface of the earth has been a limiting factor.

The LUNA collaboration is currently performing a measurement of  $^{13}\text{C}(\alpha, n)^{16}\text{O}$  in the low-background environment of the LNGS, where the environmental neutron flux is reduced by over three magnitudes with respect to the surface. This unique location, together with a high-efficiency low background detector and state of the art electronics that allow suppression of the intrinsic background, has already enabled us to push the low-energy cross section limit beyond what has been reached before.

I will present the current status of the experiment, the plans for an upcoming next measurement campaign and preliminary results.

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