

LABORATORI NAZIONALI DEL GRAN SASSO

SEMINAR ANNOUNCEMENT

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**" $^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$ - The "Holy Grail"
of Nuclear Astrophysics
Underground"**

The capture reaction $^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$ takes place in the helium burning of Red Giants. This reaction determines not only the nucleosynthesis of elements up to the iron region but also the subsequent evolution of massive stars, the dynamics of a supernova, and the kind of remnant after a supernova explosion. For these reasons, the cross section at the relevant astrophysical energy should be known with a precision of at least 10% for reliable models of late stellar evolution. In spite of tremendous experimental efforts in measuring this cross section over nearly 40 years, one is still far from this goal. The available experimental data of the reaction $^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$ will be reviewed and open problems and questions will be discussed. Finally, the prospects for new experiments will be outlined, with particular emphasis on the potentials and challenges of a direct $^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$ measurement at the proposed LUNA-MV accelerator in the Gran Sasso underground laboratory.

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