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s process related measurements at the deep underground Gran Sasso National Laboratory

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Over the recent years there has been a concerted effort to directly measure the s process neutron source cross section in the deep-underground environment of the Gran Sasso National Laboratory as part of the LUNA collaboration's experimental program. Using the 400 kV LUNA II accelerator and exploiting the ultra-low background conditions, the main s process neutron source $^{13}C(\alpha, n)^{16}O$ was measured for the first time into the Gamow energy window.

With the recent installation of the new 3.5 MV MV accelerator at the LNGS Bellotti Ion Beam facility the previously not reachable energy range of the $^{22}Ne(\alpha, n)^{25}Mg$ reaaction (Q = - 478 keV) has become accessible. As part of the SHADES ERC project a gastarget and novel detector array has been taken into operation and a first characterisation measurements were performed. In parallel preparation of a setup for the measurement of the equally important reaction channel $^{22}Ne(\alpha, \gamma)^{26}Mg$ is underway.

I will present an overview of the s process measurements at the LNGS, including the current status of the $^{22}Ne(\alpha, n)^{25}Mg$ campaign and an outlook on $^{22}Ne(\alpha, \gamma)^{26}Mg$.

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