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über
PHYSIK DER STARKEN WECHSELWIRKUNG

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E12 Seminar room 2024, Physics Department

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Experimental nuclear astrophysics deep underground at Gran Sasso

The Laboratory Underground for Nuclear Astrophysics (LUNA) in the Gran Sasso underground facility, Italy, has been designed to measure low cross sections for astrophysical purposes. The $3\text{He}(\alpha,\gamma)7\text{Be}$ study at LUNA has recently been completed [1,2], and the impact of the data on big-bang nucleosynthesis and solar 7Be and 8B neutrinos will be discussed. During the year 2007, two measurement campaigns have been performed at LUNA: First, a precision study of ground state capture in the $14\text{N}(p,\gamma)15\text{O}$ reaction. This study will help in the interpretation of the 15O neutrino data expected from the Borexino detector at Gran Sasso. Second, a study of the $25\text{Mg}(p,\gamma)26\text{Al}$ reaction producing radioactive 26Al , a tracer of live nucleosynthesis in our galaxy. Gamma-rays from 26Al have been observed in the satellite-based Integral gamma-ray observatory.

The scientific program for the next years at the current LUNA 400 kV accelerator includes the study of the $2\text{H}(\alpha,\gamma)6\text{Li}$ reaction for big-bang nucleosynthesis and the study of $15\text{N}(p,\gamma)16\text{O}$ and several other reactions of the CNO cycles. In closing, selected experiments that would benefit from the background suppression that is evident deep underground will be reviewed.

- [1] D. Bemmerer et al. (LUNA collab.), Phys. Rev. Lett. 97, 122502 (2006)
[2] F. Confortola et al. (LUNA collab.), Phys. Rev. C 75, 065803 (2007)