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Nuclear Astrophysics at the Bellotti Facility, Laboratori Nazionali del Gran Sasso

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The Bellotti Ion Beam Facility (IBF) [1] is located in the deep underground site of INFN-Laboratori del Gran Sasso (LNGS), Italy. The facility is named in honor of Enrico Bellotti, the first director of the Laboratori Nazionali del Gran Sasso (LNGS), Italy, who initiated the first installation of an underground accelerator for the study of nuclear reactions of astrophysical interest, following a proposal by C. Rolfs and G. Fiorentini. The facility offers unique opportunities for experiments with intense proton, alpha, and carbon beams in an environment where the cosmic muon flux is reduced by six orders of magnitude compared to the Earth's surface. The primary instrument at the facility is a 3.5 MV Singletron accelerator supplied by High Voltage Engineering Europa in specifications developed at LNGS [2]. The Italian Ministry of Education, University and Research funded the machine on a proposal originated by the LUNA Collaboration.

Since its inauguration in October 2023, Bellotti IBF is being operated as a scientific user facility, available to external users, with the technical management assigned to the Accelerator Service of LNGS. During the first years of operation, the Bellotti IBF has provided ion beams for nuclear astrophysics experiments, whilst concomitant measurements were undertaken for the purpose of precise ion beam energy calibration.

This presentation will provide a comprehensive overview of the characteristics at Bellotti IBF and the related perspectives in the field of Nuclear Astrophysics.

[1] The deep underground Bellotti Ion Beam Facility—status and perspectives, M. Junker, G. Imbriani, A. Best, A. Boeltzig, A. Compagnucci, A. Di Leva, F. Ferraro, D. Rapagnani, V. Rigato (2023), The deep underground Bellotti Ion Beam Facility—status and perspectives. *Front. Phys.* 11:1291113. DOI: 10.3389/fphy.2023.1291113

[2] A High Intensity, High Stability 3.5 MV Singletron™ accelerator, A. Sen, G. Domínguez-Cañizares, N.C. Podaru, J.W. Mous, M. Junker, G. Imbriani, V. Rigato; *Nuclear Instruments and Methods in Physics Research Section B* 2019; DOI: 10.1016/j.nimb.2018.09.016

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