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The Nuclear Resonance Scattering Calibration Technique for the EuroGammaS Gamma Characterisation System at ELI-NP-GBS

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ELI-NP Gamma Beam System (GBS) that will be implemented in Magurele, Romania, will deliver an intense gamma beam, obtained by collimating the radiation emerging from an inverse Compton interaction, with unprecedented performances in terms of brilliance, photon flux and energy bandwidth in an energy range from 0.2 to 20 MeV[1,2].

A gamma beam characterisation system providing a measurement of the energy spectrum, intensity, space and time profile is crucial for the commissioning. A precise energy calibration of the gamma beam and an evaluation of its stability during operation are also mandatory specifications of the ELI-NP-GBS. The gamma-beam characterisation system, designed by the EuroGammaS collaboration, consists of four elements: a Compton spectrometer (CSPEC), to measure and monitor the photon energy spectrum, in particular the energy bandwidth; a sampling calorimeter (GCAL), for a fast combined measurement of the beam average energy and its intensity, to be used also as monitor during machine commissioning and development; a nuclear resonant scattering spectrometer (NRSS), for absolute beam energy calibration and inter-calibration of the other detector elements; and finally a beam profile imager (GPI) to be used for alignment and diagnostics purposes. During this presentation, a general overview of the ELI-NP gamma characterisation system will be given and the NRSS system will be discussed.

[1] O. Adriani et al. arXiv:1407.3669 [physics.acc-ph] (2014)
[2] D. Filipescu et al. Eur. Phys. J. A 51 (2015) 185

Primary author: Dr PELLEGRITI, Maria Grazia (CT)

Co-authors: VARIOLA, Alessandro (LNF); TRICOMI, Alessia Rita (CT); SERBAN, Alin Titus (FI); ZERBO, Bruno (CT); BERTO, D. (Dipartimento di Fisica e Scienze della Terra, Universit'a di Ferrara, Ferrara, Italy); CONSOLI, E. (Istituto Nazionale di Fisica Nucleare, INFN - Sezione di Ferrara, Ferrara, Italy); EVANGELISTI, Federico (FE); GRAZIANI, G. (Istituto Nazionale di Fisica Nucleare, INFN - Sezione di Firenze, Firenze, Italy); CAPPELLO, Gigi (CT); DI DOMENICO, Giovanni (FE); PASSALEVA, Giovanni (FI); PALUMBO, Luigi (ROMA1); SPINA, M. (Dipartimento di Fisica e Astronomia, Universit'a di Catania, Catania, Italy); STATERA, Marco (FE); GAMBACCINI, Mauro (FE); LENZI, Michela (FI); MARZIANI, Michele (FE); VELTRI, Michele (FI); ANDREOTTI, Mirco (FE); STARODUBTSEV, Oleksandr (FI); ADRIANI, Oscar (FI); CARDARELLI, Paolo (FE); BORGHESI, R. (Istituto Nazionale di Fisica Nucleare, INFN - Sezione di Firenze, Firenze, Italy); ALBERGO, Sebastiano (CT)

Presenter: Dr PELLEGRITI, Maria Grazia (CT)

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