Contribution ID: **82**   Type: **Oral presentation**

A characterization system for the monitoring of ELI-NP gamma beam

Saturday, 7 July 2018 15:00 (30 minutes)

The ELI-NP facility (Extreme Light Infrastructure - Nuclear Physics) is the pillar of the European project ELI dedicated to frontier research in nuclear physics. The pillar will comprise two major research instruments: a high power laser system and a very brilliant gamma beam system. The ELI-NP Gamma beam system will deliver an intense gamma beam with unprecedented specifications in terms of photon flux, brilliance and energy bandwidth in an energy range from 0.2 to 20 MeV.

Given the challenging characteristics of the ELI beam, a specific system equipped with four basic elements has been developed to measure and monitor the beam parameters during the commissioning and the operational phase. A Compton spectrometer, to measure and monitor the photon energy spectrum, in particular the energy bandwidth; a sampling calorimeter, for a fast combined measurement of the beam average energy and its intensity; a nuclear resonant scattering system, for absolute beam energy calibration and inter-calibration of the other detector elements; and finally a beam profile imager to be used for alignment and diagnostics purposes. This talk presents an overview of the gamma beam characterization system with focus on the Compton spectrometer and the calorimeter, which were designed, assembled and are currently under test at INFN-Firenze. The layout and the working principle of these two devices will be described in detail, as well as the expected performance evaluated from simulations and results of detector tests.

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Session Classification: Mini Workshop on Instruments and Methods in HEP