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The ELI-NP Gamma Beam System: a New Facility for Nuclear Physics Research –Current Status

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The Gamma Beam System –the future user facility –is being built in the framework of the Extreme Light Infrastructure–Nuclear Physics (ELI-NP) project in Bucharest/Magurele, Romania. This is an advanced source of gamma rays based on Compton back-scattering. By collision of a visible laser beam and a high brightness relativistic electron beam, an intense (˜1011 γ/s), brilliant γ beam (<0.5% bandwidth) with Eγ up to 19.5 MeV will be obtained.

A warm RF linac operated at the C-band mode with S-band photo-injector will deliver electron beams of energy up to about 720 MeV. The photo-injector laser system will produce a sequence of trains made of 32 laser pulses at 100Hz repetition rate with a ˜10ps pulse duration in the UV range. For the Interaction Points (IP) other lasers will produce pulses with energy of 0.2J, at 515nm and 3.5ps duration at a repetition rate of 100 Hz. The collision of the interaction laser pulses with the 32 electron micro-bunches every 10 ms will be ensured by an optical cavity –multi-pass re-circulator –that will recirculate 32 times each IP laser pulse. Appropriate collimators to filter out the energy spectrum and a γ-beam characterization system will be used.

The Gamma Beam System will be a state-of-the-art machine, capable to produce gamma beams with extremely advanced features. It will pursue advanced applications in the field of national security, nuclear waste treatment, nuclear medicine, as well as fundamental studies in nuclear physics.

Currently building construction as well as acceptance procedures of linac system components corresponding to a gamma beam energy of minimum 1 MeV are completed (Project Stage I), and installation of accelerator is being started. The current status of building and RF linac for the Gamma Beam System will be presented.

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