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Status and perspectives of the ELI-NP facility

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Extreme Light Infrastructure – Nuclear Physics (ELI-NP) is a research facility aiming to use extreme electromagnetic fields for nuclear physics research. The facility will comprise two major research instruments: a high power laser system and a very brilliant gamma beam system. The high power laser system will consist of two 10 PW APOLON-type lasers providing intensities of up to $10^{23} - 10^{24} \text{ W/cm}^2$. The gamma beam, produced via Compton backscattering of a laser beam on a relativistic electron beam, will be characterized by high spectral density of about 10^4 photons/s/eV, a narrow bandwidth ($< 0.5\%$) and tunable energy of up to 20 MeV. The scientific interest of ELI-NP is covering a broad range of key topics in frontier fundamental physics and new nuclear physics. The experimental activity of the facility is focused on three directions: high-power laser studies, experiments with gamma beams and combined measurements with high-power lasers and gamma beams. Some of the main research topics of interest are: laser driven nuclear physics experiments, characterization of the laser-target interaction by the means of nuclear physics instruments, photonuclear reactions, exotic nuclear physics and astrophysics. A particular attention is also given to the development of innovative applications based on the use of both high power lasers and brilliant, narrow bandwidth gamma beams. The status of the project and the main research topics proposed to be studied at ELI-NP will be discussed.

Primary author: UR, Calin Alexandru (ELI-NP)

Presenter: UR, Calin Alexandru (ELI-NP)

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