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Over-view and strategy of the ELI-Nuclear Physics Project in Romania

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Since chirped pulse amplification scheme[1] has changed the game in high energy density physics, the available laser intensity has kept increasing, can reach 10ˆ23 W/cmˆ2 or even higher, and can deliver radiation higher than the previously used in nuclear facilities. In order to make use of this capability in full depth, a laser-centered, distributed pan-European research infrastructure, involving ultra-intense laser technologies with ultra-short pulses was triggered through the European Light Infrastructure (ELI) project at the state of the art and beyond.
The European Forum of Infrastructure (ESFRI) has selected in 2006 a proposal of constructing a 200J laser system with intensities up to 10ˆ22-10ˆ23 W/cmˆ2, called ELI at the site of Bucharest-Magurele, Romania. The rest of two large scale high intensity ELI laser facilities are built in The Czech Republic, and Hungary[2].
The scientific research at ELI-NP includes two areas where only little experimental results were reported until now. The first one is 10 PW laser-driven nuclear physics, strong-field quantum electrodynamics and associated vacuum effects. The second area is that of study driven by a Compton-backscattering gamma beam (< 20 MeV), a combination of laser and accelerator technology at the frontier of knowledge. Typical experiments planned in the early stage [3] will be introduced with the system over-view.

Reference
1. D Strickland and G Mourou, Opt. Commun. 56, 219 (1985).
 2. https://eli-laser.eu/
3. Romanian Reports in Physics, <b>68</br>, Supplement, pp. S3-S443 (2016).

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