

# **ELI-Beamlines: Extreme Light Infrastructure Science and Technology with ultra-intense Lasers**

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We will be giving an overview on the development of the “ELI-beamlines facility” [1] built within the Extreme Light Infrastructure (ELI) project based on the European ESFRI (European Strategy Forum on Research Infrastructures) process.

ELI-Beamlines will be a high-energy, repetition-rate laser pillar of the ELI (Extreme Light Infrastructure) project [2]. It will be an international facility for both academic and applied research, slated to provide user capability since the beginning of 2018. The main objective of the ELI-Beamlines Project is delivery of ultra-short high-energy pulses for the generation and applications of high-brightness X-ray sources and accelerated particles. The laser system will be delivering pulses with length ranging between 10 and 150 fs and will provide high-energy Petawatt and 10-PW peak powers. For high-field physics experiments it will be able to provide focused intensities attaining above  $10^{22}$  Wcm<sup>2</sup>, while this value can be increased in a later phase without the need to upgrade the building infrastructure to go to the ultra-relativistic interaction regime in which protons are accelerated to energies comparable to their rest mass energy on the length of one wavelength of the driving laser. The design concepts and designs for different areas including building, lasers, beam distribution and secondary source beamlines for this new user's facility will be discussed. We will focus on experimental opportunities in plasma and high density physics that will be possible when combining both 10-Hz PW beamlines and the kilojoule beamline. The status and timelines of the project delivery will be presented.

## **References**

[1] Web page of ELI (<http://www.eli-beams.eu>).

[2] G. Mourou, G. Korn, W. Sandner, and J.L. Collier. ELI - Extreme Light Infrastructure: Science and Technology with Ultra-Intense Lasers Whitebook, 2011.