ELI Beamlines: The High-Peak, High-Average Power Laser Facility of the Extreme Light Infrastructure

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The ELI Beamlines Facility is a pillar of the ELI (Extreme Light Infrastructure) ERIC pan-European Research Infrastructure hosting the world's most intense laser sources. ELI Beamlines developed and operates four cutting edge high-peak, high-average power femtosecond laser systems and offers a unique combination of primary (lasers up to 10 PW peak power) and secondary (high-energy particles and X-rays) sources to the international user community. Currently, several beamlines are operational and being upgraded to reach their full performances, while other beamlines are in their commissioning phase. Laser-driven particle accelerators have gained interest in the recent years thanks to their versatility and innovative features. This interest has pushed forward the development of beamlines where users can exploit the unique parameters (e.g. ultrashort bunch duration and ultrahigh dose rate) of laser-driven particle accelerators (ion and electron beams) and radiation (XUV to gamma-ray sources) for a wide range of applications. The current performance of particle and radiation sources available at the ELI Beamlines user facility will be presented and discussed along with their potential use for multidisciplinary applications. The high repetition rate capability of the available primary and secondary sources will be highlighted in combination with a range of advanced target delivery solutions and diagnostics in operation in extreme laser-plasma conditions.