

Ultra-intense laser pulses and the High-Power Laser System at Extreme Light Infrastructure - Nuclear Physics

Daniel Ursescu

*National Institute for Physics and Nuclear Engineering, Extreme Light Infrastructure - Nuclear
Physics, Reactorului 30, 077125, Magurele, Ilfov, Romania*

Lasers make possible production and ultimate control of electromagnetic fields in terms of spectral purity, confinement below micrometer level, duration down to single cycle in the femtosecond domain or shorter and strengths highest irradiances achieved by mankind. Ultra-intense laser facilities are pushing the limits of the achievable pulse irradiance, hence the coined term extreme light. They make possible fundamental and applied investigations in physics and material science with emergent societal impact. Extreme Light Infrastructure is the most advanced project dedicated to production and use of such extreme fields.

A summary on the current status and plans concerning the ultra-intense laser facilities at the PetaWatt level and above will be provided. The Extreme Light Infrastructure project will be outlined, with emphasis on the extreme light capabilities of the three pillars. The architecture of the first finalized 10PW high power laser system (HPLS) will be highlighted. This dual arm, 10PW each, laser system, at Extreme Light Infrastructure Nuclear Physics, in Romania, which demonstrated 10PW pulses in August 2020, delivers beams in five experimental areas that address research centered on nuclear physics, materials in extreme environments and exotic physics.