Results on the commissioning of the 1 PW experimental area at ELI-NP

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Last year at the ELI-NP (Extreme Light Infrastructure - Nuclear Physics) research facility, the commissioning of the 1 PW experimental area has been successfully performed with a TNSA experiment on proton acceleration. A 23 fs laser beam was focused to a peak intensity of the order of $I_0 \sim 10^{21}$ Wcm^{-2} in a spot size of ~3.5 μm FWHM via an F/3.7 parabolic mirror. The beam's pointing was stable at ±2 μm during a full day's run. We have run the experiment in a configuration without and with a plasma mirror. We assessed the systems' performance through a wide parametric scan of different target materials and thicknesses ranging from hundreds of nm to micrometers. Multiple laser and plasma diagnostics were deployed to characterize the laser beam and the by-products of the interaction on a shot-to-shot base. We diagnosed the ion beam spectrum using standard plasma diagnostics, for instance: Thomson parabola, stacks of Radiochromic films, CR39 and activation methods. We also characterized the laser properties such as: near-field and far-field profiles, laser spectrum and pulse duration at full energy in the interaction chamber and the laser temporal contrast via optical plasma probing and third order auto-correlator diagnosis. We evaluated the reflected and back-scattered laser light from target. We obtained proton and carbon energies greater than 40 MeV and 15 MeV/n respectively. We are performing hydrodynamic and PIC simulations to evaluate the effects of the laser temporal contrast on the ion acceleration. A short overview of the next steps and upcoming commissioning experiments will be also presented.