Contribution ID: **17** Type: **Poster (participant)**

MACRO Tools for Real-time Analysis of Laser-driven Experiments at ELI-NP

Monday, 14 April 2025 17:10 (1h 30m)

Swift macro-tools can be useful when real-time analysis is key, such as fast image capturing and processing, for instance, when studying multi-parametric phenomena such as LWFA.
During tight beamtime schedules, such an approach is central to quickly optimizing physical outputs via fast diagnostics. In LWFA investigation, where high repetition rate shots can be carried out, fast processing can help achieve desirable results such as high-quality laser-plasma interaction, suitable plasma parameters, and stable quasi-monoenergetic electron beams with high cut-off energy. During the commissioning activities of the ELI-NP 10 PW experimental area, we have developed and begun applying such real-time analysis tools. In this work, we will present some of our experimental results and illustrate the codes employed during the experimental runs. Generally, ELI-NP is also currently working on developing machine learning tools and AI algorithms to be used by the Users during the experimental campaigns.

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Session Classification: Poster Session