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Recent updates on the nano-foil target positioning system

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The commissioning of the Laser-driven ION beamline (LION) at the Centre for Advanced Laser Applications (CALA) in Garching near Munich required a repetition rated target system. The nano-foil target positioning system for intense laser plasma experiments as presented by Gao et al was developed for this purpose and demonstrated at the ATLAS 300 tera-watt Ti:Sa laser. This device can store ~1700 target foil position prior to the experiment and recall them with an accuracy of $\sim 5 \mu\text{m}$ during an experiment. Since this publication it was adapted to the ATLAS peta-watt upgrade and looser focusing from an $f/2$ to an $f/5$. The target holders were redesigned to counter the increase of fratricides of nearest neighbor targets due to higher pulse-energy and increased focal-spot size. The distance between the holes has been increased and their diameter expanded to 1.5 mm. Each of the 19 holders can easily clip on to three spherical magnets, which are glued into the new PMMA plastic wheel frame. This frame is not manufactured with the same precision as the previous and additional position offsets are compensated by the software. The software has been ported to python and fully integrated within our TANGO controls setup. With the update, the preparation of the target alignment is now fully automated in vacuum, and records an image of each registered target. These are automatically previewed to the operator during the experiment who can reject individual targets based on visible damages. The current implementation of the software is not synchronized to the laser and is limited to one shot every 6 seconds.

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