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A Paultrap-system for isolated targets at high-power laser systems

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We present a target positioning system based on an electrodynamic trap specifically designed for high-power laser plasma interactions. By applying an electro-optical damping technique, micron-precise positioning of isolated targets of arbitrary material and shape is enabled, ensuring reliable overlap with the laser focus. Results from a beamtime at the TPW [1] and two beamtimes at the PHELIX-PW [2] show expected acceleration mechanisms and reproducible acceleration of protons and ions using plastic, copper and tantalum spheres. Current developments include the automatization of the trapping process for faster (sub-minute) target replacement, to satisfy requirements for the high repetition-rate PW laser at the new 'Center for advanced laser applications'(CALA) in Garching. Within the same update-phase trapping of planar nano-platelets made of Gold or Graphene will be pursued. We present our strategies for automatization as well as for trapping, positioning and alignment of such free-floating platelet. The repetition-rate will allow for applications using radiation being generated in the laser-plasma interaction [e.g. 1,2]. The novel platelet target may facilitate experimental tests of intriguing yet experimentally inaccessible ideas that have thus far only been studied via simulation [e.g. 3,4,5].

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