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Isochoric heating of solid gold targets with the PW-laser-driven ion beams

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We present first results on ion acceleration with the BELLA PW laser as well as end-to-end simulation for isochoric heating of solid gold targets using PW-laser generated ion beams: (i) 2D Particle-In-Cell (PIC) simulations are applied to study the ion source characteristics of the PW laser-target interaction at the long focal length (f/65) beamline at laser intensities of ~ 〖5×10〗^19 Wcm-2 at spot size of ⊠0=53 ⊠m on a CH target. (ii) In order to transport the ion beams to an EMP-free environment, an active plasma lens will be used. This was modeled [1] by calculating the Twiss parameters of the ion beam from the appropriate transport matrixes taking the source parameters obtained from the PIC simulation. (iii) Hydrodynamic simulations indicate that these ion beams can isochorically heat a 1 mm3 gold target to the Warm Dense Matter state.

Reference:
J. van Tilborg et al, Phys. Rev. Lett. 115, 184802 (2015).

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