**X-ray radiography of a titanium wire isochorically heated by laser-accelerated electrons**

O Turianska1,9, A. S. Martynenko 9, S. A. Pikuz 2,3, L. Antonelli 4, F. Barbato 1,

G. Boutoux 1,5, L. Giuffrida 6, E. Hum 4, J.  Jacoby 7, D. Khaghani 1, K. Lancaster3,

P. Neumayer8, O. N. Rosmej 8, E. Filippov 2,3, and D. Batani 1

1. *Universitè de Bordeaux, CNRS, CEA, CELIA, UMR 5107, F-33405, Talence, France*
2. *Joint Institute for High Temperatures of Russian Academy of Sciences, Moscow, Russia*
3. *National Research Nuclear University MEPhI, Kashirskoe Sh. 31, Moscow, Russia*
4. *Department of Physics, York Plasma Institute, The University of York, Heslington, UK*
5. *CEA, DAM, CESTA, F-33116 Le Barp, France*
6. *Institute of Physics of the CAS, ELI Beamlines, Na Slovance 2, Prague, Czech Republic*
7. *Institute of Applied Physics, Goethe University, Frankfurt am Main , Germany*
8. *GSI Helmholtzzentrum fur Schwerionenforschung, Darmstadt, Germany*
9. *Focused Energy, 64291 Darmstadt, Germany*

We performed an experiment using the laser Phelix at GSI to isochorically heat a wire and study its following expansion using time resolved X-ray radiography.

A mm-long titanium wire (50 µm in diameter) was irradiated on its tip by the laser pulse with duration τ=0.5 ps, energy E=50 J and intensity I . Hot electrrosn were gereated innteh interaction and propagated along the wire isochorically heating the titanium material. X-ray emisison spectroscopy (FSSR) of the titanium K-a line was performed to retrieve the wire temperature along the wire, i.e. T=T(z) where z=0 corresponds to the wire tip [1, 2].

After this initial quasi-instantaneous heating, the expansion of the wire was followed using time-resolved X-ray radiography. Backlighter target was 5um tungstenwire illuminated by a second laser beam with similar characteristics. Measurement of wire expansion was done at different time by changing the delay between the two laser beams. X-ray radiography was successfully used to measure plasma expansion and sound velocity cs = cs (z).

We observed how local plasma expansion velocity along the wire is consistent with the temperature extracted from FSSR data [2]

[1] A. Schönlein,G. Boutoux, S. Pikuz, L. Antonelli, D. Batani, A. Debayle, A. Franz, L.Giuffrida, J.J. Honrubia, J. Jacoby, D. Khaghani, P. Neumayer, O.N. Rosmej, T. Sakaki, J.J. Santos, A. Sauteray « Generation and characterization of Warm Dense Matter isochorically heated by laser-induced relativistic electrons in a wire target» Europhys. Lett, 114, 45002 (2016)

[2] A. S. Martynenko, S. A. Pikuz, L. Antonelli, F.Barbato, G. Boutoux, L. Giuffrida,J. J. Honrubia, E.Hume, J. Jacoby, D. Khaghani, K. Lancaster, P.Neumayer, O.N.Rosmej, J. J. Santos, O. Turianska, and D. Batani. Role of relativistic laser intensity on isochoric heating of metal wire targets” Optics Express 29 (2021)