**1D Space-Time & 2D Space Resolved Hot Electron Generation**

**At Shock Ignition Relevant Laser-Matter Coupling Parameters**

O. Renner1,2,3, D. Batani4, G. Cristoforetti5, M. Červeňák2, R. Dudžák1,2, E. Filippov6,

P. Gajdoš2, L.A. Gizzi5, L. Juha1, Ph. Korneev7, P. Koester5, M. Krůs2, A. Martynenko8, P. Nicolai,4 S. Pikuz,6 T. Pisarczyk9, S. Singh1,2 , A. Tentori4, S. Weber1

*1 Institute of Physics, Czech Academy of Sciences, Prague, Czech Republic*

*2 Institute of Plasma Physics, Czech Academy of Sciences, Prague, Czech Republic*

*3 Extreme Light Infrastructure ERIC, ELI Beamlines Facility, Dolní Břežany, Czech Republic*

*4 Université Bordeaux, CNRS, CEA, CELIA, Talence, France*

*5 National Institute of Optics, CNR, Pisa and Florence, Italy*

*6 Joint Institute of High Temperature of RAS, Moscow, Russian Federation*

*7 P.N. Lebedev Physical Institute of RAS & MEPHI, Moscow, Russian Federation*

*8 GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany*

*9 Institute of Plasma Physics and Laser Microfusion,Warsaw, Poland*

The detailed investigation of HE production and their interaction with matter is of paramount interest for fundamental directed research in the fields of laboratory astrophysics and in general high-energy-density physics. The more practical applications refer to the HE role in a development of diverse scenarios for inertial confinement fusion, where the laser coupling to fast electrons and their transport inside the ICF capsules affects the efficiency of the energy delivery to the ignition region. This is particularly true for the shock ignition scheme anticipating the ignition by the sub-ns-laser spike with intensity close to 1016 W/cm2.

The kinetics of HE generation and their impact on formation of strong shocks however have not been fully understood yet. The aim of experiments conducted at the Prague PALS laser facility is to collect precise data needed for development of theoretical models describing the HE formation, transport, and energy deposition inside targets which affect the dynamics of strong shocks. Here we report x-ray measurements characterizing HE generation via 1D space-time and 2D space-resolved imaging of HE-induced Kα emission inside the cold target material. The experiments were performed at the PALS iodine laser facility with intensities up to 2×1016 W/cm2, i.e., at parameters of the laser-plasma coupling suitable to address the physics of the laser spike induced shock wave igniting the fusion reaction. The principal part of the experimental setup consisted of the imager which combined the spherically bent crystal of quartz (422) with the Hamamatsu x-ray streak camera or with the absolutely calibrated imaging plate detector to obtain magnified monochromatic images of the HE-induced K-shell emission from the laser irradiated Cu containing targets. The experimental limits of the HE measurements are derived, the algorithms used for reconstruction of raw images via application of the ray tracing procedure and the Geant4 code are described. The HE characteristics observed at different geometry flat and spiral-shaped targets are presented and discussed in detail.