Th-8.

Experiments on the indirect heating of low density aerogels for applications in heavy ion stopping in plasma

O.N. Rosmej[1], A. Blazevic[1], N. Suslov[2], A. Kunin[2], A. Pinegin[2], , D. Schäfer[3], Th. Nisius[3], Y. Zhao[4], T. Rienecker[5], J. Wiechula[5], N. Orlov[6], V. Bagnout[1], U. Eisenbarth[1], G. Vergunova[7], N. Borisenko[7], N. Zhikov[2], V. Vatulin[2], Th. Wilhein[3], Th. Stöhlker[1], V. Fortov[6]

[1]*Geselschaft für Schwerionenforschung, Darmstadt, Germany*
[2]*VNIIEF-Sarov, Russia*
[3]*Reihn-Arc-Campus Remagen, Germany*
[4]*Institure of Modern Physics, Lanzhou, China*
[5]*University of Frankfurt am Main, Germany*
[6]*Joint Institute for High Temperatures, Moscow, Russia*
[7]*Lebedev Physical Institute, Moscow, Russia*

The unique combination of a *Petawatt High-Energy Laser System for Ion beam eXperiments – "Phelix"* (Nd:glass, 1053nm, 300-500 J,1-15ns) [1] and intense heavy ion beams of the *UNILAC* accelerator at *GSI-Darmstadt* allow creating and probing of hot plasmas with a density of some percentage of solid-state density. The experimental program aims at the investigation of fundamental features of heavy ion stopping in ionized matter in view of promising applications for the Heavy Ion Fusion and astrophysics [2, 3]. For combined experiments on the interaction of heavy ion beams with ionized matter (GSI) a high density plasma target with homogeneous in time (~ 5 ns) and space (~1mm) plasma parameters is required. For these purposes we are developing the combined target which consists on the Gold hohlraum (converter) and low Z foam target heated by the hohlram radiation before probed by an ion bunch. Foam targets are rather promising due to the effective conversion of the deposited radiation energy into the internal plasma energy and slow hydrodynamic response on the heating. Direct irradiation of the Gold converter walls with a nanosecond pulse delivered by the PHELIX-laser system (GSI) leads to hohlraum radiation spectra in the photon energy range of 50-500 eV. Expected temperatures of the foam targets heated by this radiation amount to 20-30 eV at electron densities of 10^{21} cm^{-3}. The results of the last hohlraum experiments carried out at PHELIX-laser energies of 200 -250 J will be presented. In experiments the hohlraum radiation field, the conversion efficiency of the laser energy into soft X-rays, duration of the soft X-ray pulse, and parameters of the heated with X-rays foam targets have been measured.

Aknowlegments
This work is supported by ISTC#2264 grant.

References:

[1]. Bagnoud, V.; Aurand, B.; Blazevic, et al., *Commissioning and early experiments of the PHELIX facility.* Appl Phys B, DOI 10.1007/s00340-009-3855-7 (2009)
[2]. R. Bock, I. Hoffmann and R. Arnold, Nucl. Sci. Appl 2 (1984) 97
[3]. C. Deutsch, Ann. Phys. 11 (1986) 1
[4]. A.M. Khalenko, N.G. Borisenko et al, Laser and Particle Beams (2006), 24, 283-290
[5]. E. Vasina, V. Vatulin (VNIIEF, Sarov). Experimental Scheme for Investigation of Ion Stopping in Plasma-Indirect Laser Target Design. GSI-2000-2 Report June 2000, p.52, www.gsi.de