Particle acceleration and neutron production from sub-micro-sized targets irradiated by an ultrashort laser pulse

Bochkarev S G[1,2,@], Gozhev D A[1,3], Brantov A V[1,2] and Bychenkov V Yu[1,2]

[1] Lebedev Physical Institute of the Russian Academy of Sciences, Leninsky Avenue 53, Moscow 119991, Russia
[2] Dukhov Research Institute of Automatics (VNIIA), Luganskaya 9, Moscow 115304, Russia
[3] International Laser Center, Lomonosov Moscow State University, Leninskie Gory 1, Moscow 119991, Russia

[@] bochkarevsg@lebedev.ru

In this work laser-initiated generation of thermonuclear neutrons from various sub-micro-sized targets irradiated by an ultrashort laser pulse has been studied using three-dimensional numerical simulation, using the previously obtained results of large-scale structural optimization of the target, which provides its best heating by femtosecond laser pulses of moderate intensity [1]. The report compares the efficiency of neutron generation from various targets including micro-wires, micro-layers (relief) on the surface of a flat foil, cylindrical micro-cavities and micro droplets. It is shown that, for modern laser technologies, femtosecond lasers of low (multi-mJ) energy are even more preferable for creating a neutron source than more powerful (1 J) lasers due to the practically available mode of high (1 kHz) pulse repetition rate.
This work was supported by the Russian Science Foundation, project No. 17-12-01283.

[1] Gozhev D A, Bochkarev S G, Busleev N I, Brantov A V, Kudryashov S I and Bychenkov V Y 2020 *High Energy Density Physics* **37** 100856