Abstract Submitted
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Study of proton generation using thin metal wires with a sharp tip[1] ANATOLY MAKSIMCHUK, GENNADY FIKSEL, KARL KRUSHELNICK, University of Michigan, VALERY YU. BYCHENKOV, ANDREY V. BRANTOV, Lebedev Physics Institute, Moscow, Russia — It was suggested to use the highly enhanced electric field close to a low-power-laser-illuminated metal tip for nanometric optical tweezers [1]. Recently, a boost in proton acceleration by high-intensity laser using structured snow-like targets was observed and attributed mostly due to the field enhancement at the whisker tip [2]. Here we report on a more controlled high-intensity laser experiment by using thin metal wires with a diameter of 20 microns with tips of different size ranging from 0.2 to 5.0 microns. 400 fs, 15 TW laser pulses were focused to an intensity of up to $3x10^{19}$ W/cm^2 on a tungsten wire at different distances from the tip. We have observed two high-energy proton beams. One beam was produced through the Target Normal Sheet Acceleration (TNSA) mechanism and was perpendicular to the wire and the other one was observed from the wire tip and in the direction along the wire axis. Simultaneous measurements of maximum proton energies using CR-39 nuclear track detectors and high energy electrons using imaging plates in both direction were performed and will be presented. The experimental results were interpreted taking into account the generated electric and magnetic fields near the surface of the wire and at the wire tip as well as a strong collimated surface current along the wire. [1] L. Novotny et al., Phys. Rev. Lett. 79, 645 (1997). [2] A. Zigler et al., Phys. Rev. Lett. **110**, 215004 (2013).

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