Abstract Submitted
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Fusion neutron generation in deuterated nanowire arrays irradiated by femtosecond pulses of relativistic intensity[1] CHASE CALVI, ALDEN CURTIS, Colorado State University, JIM TINSLEY, National Security Technologies, REED HOLLINGER, SHOUJUN WANG, ALEX ROCKWOOD, YONG WANG, CONRAD BUSS, VYACHESLAV SHLYAPTSEV, Colorado State University, ALEXANDER PUKHOV, VURAL KAYMAK, Heinrich-Heine-Universitat Dusseldorf, JORGE ROCCA, Colorado State University — We have demonstrated a new dense fusion environment created by irradiating arrays of deuterated nanostructures with Joule–level pulses from a compact ultrafast Ti:Saphire laser. The irradiation of ordered deuterated polyethylene nanowires arrays with femtosecond pulses of relativistic intensity is shown to create ultra-high energy density plasmas in which deuterons (D) are accelerated to MeV energies, efficiently driving D-D fusion reactions and ultrafast neutron pulses. We have measured up to 2 x 10^6 fusion neutrons/Joule, a 500 times increase respect to flat solid targets, a record yield for Joule-level lasers, and have also observed a rapid increase in neutron yield with laser pulse energy. We present results of a first experiments conducted at intensities >1 x 10^{21} W cm^{-2} that has generated >1 x 10^7 fusion neutrons per shot. This material is based on work supported by the Air Force Office of Scientific Research under award number FA9560-14-10232, and by NSTec.

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