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Neutron generation in deuterated nanowire arrays irradiated by femtosecond pulses of relativistic intensity[1] ALDEN CURTIS, CHASE CALVI, Colorado State University, JIM TINSLEY, National Security Technologies, REED HOLLINGER, SHOUJUN WANG, ALEX ROCKWOOD, CONRAD BUSS, VYACHESLAV SHLYAPTSEV, Colorado State University, VURAL KAYMAK, ALEXANDER PUKHOV, Heinerich-Heine-Universitat, YONG WANG, JORGE ROCCA, Colorado State University, COLORADO STATE UNIVERSITY COLLABORATION, NATIONAL SECURITY TECHNOLOGIES COLLABORATION — Nuclear fusion is regularly created in spherical plasma compressions driven with multi-kilojoule lasers. Driving fusion reactions with compact lasers that can be fired at much higher repetition rates is also of interest. We have demonstrated a new dense fusion environment created by irradiating arrays of deuterated nanostructures with Joule–level pulses from a compact Ti:Sa 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 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 generated >1 x 10^7 fusion neutrons per shot.

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