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Neutron Emission in Deuterium Dense Plasma Foci BRIAN APPELBE, JEREMY CHITTENDEN, Imperial College London — We present the results of a computational study of the deuterium dense plasma focus (DPF) carried out to improve understanding of the neutron production mechanism in the DPF. The device currents studied range from 70 kA to several MA. The complete evolution of the DPF is simulated in 3D from rundown through to neutron emission using a hybrid computational method. The rundown, pinching, stagnation and post-stagnation (pinch break-up) phases are simulated using the 3D MHD code Gorgon. Kinetic computational tools are used to model the formation and transport of non-thermal ion populations and neutron production during the stagnation and post-stagnation phases, resulting in the production of synthetic neutron spectra. It is observed that the break-up phase plays an important role in the formation of non-thermal ions. Large electric fields generated during pinch break-up cause ions to be accelerated from the edges of dense plasma regions. The dependence on current of the neutron yield, neutron spectra shape and isotropy is studied. The effect of magnetization of the non-thermal ions is evident as the anisotropy of the neutron spectra decreases at higher current.

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