Contribution ID : **103** Type : **not specified**

12.28 A New Tri-Particle Mono-Energetic Backlighting/Stopping-Power Platform for the National Ignition Facility and OMEGA

Wednesday, 18 April 2018 20:31 (120)

The D3He backlighter platform, based on laser-driven implosions of D3He-filled capsules, generates mono-energetic 14.7-MeV and 3.0-MeV protons and has been used with success on OMEGA and the NIF for both radiography and stopping-power studies. We now propose a tri-particle mono-energetic backlighter based on a DT3He gas-filled capsule implosion that will provide 14.7-MeV and 3.0-MeV protons plus 9.5-MeV deuterons from the T3He reaction. This third particle is important for both backlighting and stopping experiments, and will result in high-quality radiographs of E and B fields and plasma matter. To obtain acceptable signal to background ratios for all three particles, the D:T:3He ratio will be optimized through extrapolation from existing T3He data and experiments on OMEGA. T and 3He will dominate the fuel to maximize the T3He deuteron yield. Relevant to this work, recent experiments on OMEGA (2017/07/12) had T3He yields >1e9, meeting the requirements of radiography and stopping power. This work explores the capabilities of the proposed platform, the CR39 detection configuration, and optimization of the fuel ratio. This work is supported by LLNL (B613027, B615534), NLUF (DE-NA0002035), LLE (415935-G).

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Session Classification : Session #12, Wednesday Night Poster Session