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Design of a liquid membrane target for high repetition rate neutron generation[1] PATRICK POOLE, C. DAVID ANDERECK, MIKE STORM, DOUGLASS SCHUMACHER, The Ohio State University — Ultra-bright, pulsed, spatially-small sources of energetic neutrons have applications in radiography and non-destructive remote sensing. Neutrons can be generated by a process wherein ions accelerated from a laser-irradiated primary target subsequently bombard a converter material, causing neutron-producing nuclear reactions, such as $^{7}Li(d,n)^{8}Be$. Deuterons from this process are suppressed by contamination that builds up on the rear of the solid primary target. To eliminate this issue we propose a self-replenishing liquid membrane target consisting of heavy water and deuterated surfactant, formed in-vacuum within a moveable wire frame. In addition to removing issues associated with solid target positioning and collateral damage, this apparatus provides flow rate and target thickness control, and allows for the high repetition rates required to generate desired neutron fluxes with a portable laser-based system. The apparatus design will be presented, as well as a novel interferometric method that measures the membrane thickness using tightly-focused light.

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Patrick Poole
The Ohio State University

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