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Control of quasi-monoenergetic electron beams from laser-plasma accelerators by adjusting shock density profile[1] HAI-EN TSAI, KELLY K. SWANSON, REMI LEHE, SAM K. BARBER, FUMIKA ISONO, JORGE G. OTERO, XINYAO LIU, HANN-SHIN MAO, SVEN STEINKE, JEROEN VAN TILBORG, CAMERON G. R. GEDDES, WIM LEEMANS, Lawrence Berkeley Natl Lab — High-level control of a laser-plasma accelerator (LPA) using a shock injector was demonstrated by systematically varying the shock injector profile, including the shock angle, up-ramp width and shock position. Particle-in-cell (PIC) simulation explored how variations in the shock profile impacted the injection process and confirmed results obtained through acceleration experiments. These results establish that, by adjusting shock position, up-ramp, and angle, beam energy, energy spread, and pointing can be controlled. As a result, e-beam were highly tunable from 25 to 300 MeV with <8% energy spread, 1.5mrad divergence and <1mrad pointing fluctuation. This highly controllable LPA represents an ideal and compact beam source for the ongoing MeV Thomson photon experiments. Set-up and initial experimental design on a newly constructed one hundred TW laser system will be presented.

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