Abstract Submitted for the DPP20 Meeting of The American Physical Society

Evolution of the laser's wavefront and mode during propagation through the amplifier and transport line of a 100-TW-class laser system¹ CURTIS BERGER, JEROEN VAN TILBORG, FUMIKA ISONO, SAMUEL BARBER, HAI-EN TSAI, TOBIAS OSTERMAYR, CAMERON GEDDES, ERIC ESAREY, Lawrence Berkeley National Laboratory — Laser Plasma Accelerators (LPAs) require high-quality drive lasers in order to generate high-quality electron beams; however, it is known that the propagation of the laser beam through the amplifier, beam expander, compressor, and transport chain will make the laser beam susceptible to unwanted spatial amplitude and phase modulations. As such, developing reliable diagnostic tools to identify the wavefront and mode evolution, and their dependence on the optical elements in the beamline, will provide critical insight. In this regard, parasitic traits that may be inherited from these optical elements can be probed and eliminated or replaced from the transport line thereby increasing the quality of the drive-laser. We will present simulations and experimental results aimed at understanding the evolution of the mode and wavefront of a high-power drive laser, and their impact on the final focus properties.

¹This work was supported by the U.S. Department of Energy (DOE) under Contract No. DE-AC02-05CH11231, and by the Gordon Betty Moore Foundation under Grant ID GBMF4898.

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Date submitted: 29 Jun 2020

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