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Time-resolved measurement of power transfer in plasma amplifier optic[1] PATRICK POOLE, ROBERT KIRKWOOD, TOM CHAPMAN, SCOTT WILKS, DAN KALANTAR, MATTHEW EDWARDS, PIERRE MICHEL, LAURENT DIVOL, JEFF BUDE, BRENT BLUE, KEVIN FOURNIER, BRUNO VAN WONTERGHEM, Lawrence Livermore Natl Lab, NAT FISCH, Princeton Plasma Physics Laboratory, PETER NORREYS, Oxford University, WOJCIECH ROZMUS, University of Alberta — New intense laser applications require increases in pulse energy, power, and intensity beyond the limitations of conventional solid-state media. Plasma optics are a promising solution due to their increased resiliency to damage but require characterization in the linear and nonlinear response regimes. The plasma amplifier project at NIF has demonstrated the combination of up to 21 frequency shifted beams via Cross-Beam Energy Transfer, achieving 10x amplification of a seed beam up to nearly 8 kJ in a 1 ns pulse. Full characterization of the plasma optic is underway, most recently by investigating power transfer (both seed amplification and pump depletion) with ˜100 ps time resolution of seed beams from 1 ns down to 100 ps in duration. This investigation of the ion wave response timescale for ˜kJ scale transfers is a critical step toward achieving beam combination not just to high energy but also high power. Experimental details and supporting simulation results will be discussed.

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