Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Probing lattice dynamics in silicon with laser-wakefield accelerated electrons[1] JOHN NEES, Z-H HE, A.G.R. THOMAS, KARL KRUSHELNICK, U. Michigan, S. SCOTT, M. LEGALLY, U. Wisconsin-Madison, B. BEAUREPAIRE, G. GALL, J. FAURE, LOA U. Paris-Saclay — Laser wakefield acceleration is the key technology in a new breed of electron and photon beam sources that operate in the ultrafast domain. We show that the spatial and temporal properties of wakefield-generated electron beams can be manipulated to enable them interrogate ultrafast lattice dynamics in freestanding single-crystal silicon membranes, while maintaining spatial resolution on the atomic scale. In particular, picosecond resolution of Si lattice dynamics is obtained by recording streaked electron diffraction peaks using static magnetic fields. We will also discuss the role of wave front control in establishing optimal beam characteristics and the significance of single-shot measurements.

[1]Michigan support from NSF PHY-1535628

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Date submitted: 15 Jul 2016 Electronic form version 1.4