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Toward
Extrapolating Two-Dimensional High-intensity Laser-Plasma Ion Acceleration Particle-in-Cell Simulations to Three Dimensions[1] D. J. STARK, L. YIN, B. J. ALBRIGHT, F. GUO, Los Alamos National Laboratory — A PIC study of laser-ion acceleration via relativistic induced transparency points to how 2D-S (laser polarization in the simulation plane) and -P (out-of-plane) simulations may capture different physics characterizing these systems, visible in their entirety in (often cost-prohibitive) 3D simulations. The electron momentum anisotropy induced in the target by the laser pulse is dramatically different in the two 2D cases, manifesting in differences in polarization shift, electric field strength, density threshold for onset of relativistic induced transparency [1], and target expansion timescales. In particular, a trajectory analysis of individual electrons and ions may allow one to delineate the role of the fields and modes responsible for ion acceleration. With this information, we consider how 2D simulations might be used to develop, in some respects, a fully 3D understanding of the system. [1] D. J. Stark, et al., *Phys. Rev. Lett.* **115**, 025002 (2015).

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