Abstract Submitted
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Self-Consistent Hamiltonian Model of Beam Transport in a Laser-Driven Plasma Accelerator[1] B.A. SHADWICK, LOASIS Program, LBNL and Institute for Advanced Physics, G.M. TARKENTON, Institute for Advanced Physics, C.B. SCHROEDER, LOASIS Program, LBNL — Starting from the two species (bulk and beam electron) Vlasov–Maxwell system, we develop a self-consistent Hamiltonian model of beam transport in a background plasma where the beam is described by phase-space moments. The formalism used, based on the Hamiltonian structure of the Vlasov–Maxwell system, is a direct extension of that previously used to derive our warm fluid model.[2] The bulk plasma model is independent of the moment model for the beam; in practice we find that a fluid description of the bulk plasma is appropriate. We present a detailed study of beam propagation in a resonant laser-wakefield accelerator. We discuss optimization of the system with regard to energy gain and beam quality. We comment on the implications for GeV-class accelerator stages.

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[2]B. A. Shadwick, G. M. Tarkenton and E. H. Esarey, Phys. Rev. Lett. **93**, 175002 (2004).

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