

Abstract Submitted  
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**Two-Dimensional Radiation Transport in Cylindrical Geometry:  
Ray-Tracing Compared to Monte Carlo Solutions for a Two-Level Atom<sup>1</sup>**

J.P. APRUZESE, J.L. GIULIANI, Plasma Physics Division, Naval Research Laboratory — Radiation plays a critical role in the dynamics of Z-pinch implosions. Modeling of Z-pinch experiments therefore needs to include an accurate but efficient algorithm for photon transport. Such algorithms exist for the one-dimensional (1D) approximation. In the present work, we report progress toward this goal in a 2D (r,z) geometry, intended for use in radiation hydrodynamics calculations of dynamically evolving Z pinches. We have tested a radiation transport algorithm that uses discrete ordinate sets for the ray in 3-space, and the multifrequency integral solution along each ray. The published solutions of Avery et al. [1] for the line source functions are used as a benchmark to ensure the accuracy of our approach. We discuss the coupling between the radiation field and kinetics that results in large departures from LTE, ruling out use of the diffusion approximation. [1] L. W. Avery, L. L. House, and A. Skumanich, *JQSRT* **9**, 519 (1969).

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