1089-68-372 **Christopher Tomkins*** (ctomkins@lanl.gov), Physics Division, P-21, MS D410, Los Alamos, NM 87507, and **Hanna Makaruk**. *3D effects in axisymmetric reconstructions: theory, simulation and experiment.* Preliminary report.

In a variety of penetrating imaging diagnostics, quantities of interest are reconstructed from a single-view measurement under an assumption of axisymmetry. Here we employ theory, simulation and experiment to explore the effects of 3-dimensionality on these reconstructions. A key finding is that 3D effects may cause local negative densities, which are clearly unphysical, to appear in Abel inverse-type reconstructions. Analytical solutions are derived for violations of the axisymmetric assumption in the form of simple geometric shapes, and numerical Abel inversions are also performed on similar geometric problems. Both theory and numerics predict significant regions of inferred negative density under these conditions. These predictions are tested against an experimental measurement of known, idealized objects (spheres) using quantitative penetrating radiography. Results are compared for various values of the characteristic parameter, D/r (where D is the distance from reconstruction axis, r is the sphere radius). The results suggest that negative density values in Inverse-Abel reconstructions should not be ignored; instead, they provide potentially important insights into the 3D nature of the underlying phenomena. (Received February 19, 2013)