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Resistivity and anisotropic return currents in warm dense plasmas NIGEL WOOLSEY, University of York, NICOLA BOOTH, A. ROBINSON, Rutherford Appleton Laboratory, P. HAKEL, Los Alamos National Laboratory, R. CLARKE, STFC Rutherford Appleton Laboratory, R. DANCE, University of York, D. DOIA, Queen's University of Belfast, L. GIZZI, ILIL, Istituto Nazionale di Ottica, G. GREGORI, University of Oxford, P. KOESTER, L. LABATE, ILIL, Istituto Nazionale di Ottica, B. LI, Rutherford Appleton Laboratory, M. MAKITA, Queen's University of Belfast, R. MANCINI, University of Nevada, Reno, J. PASLEY, University of York, P. RAJEEV, Rutherford Appleton Laboratory, D. RILEY, Queen's University of Belfast, E. WAGENAARS, J. WAUGH, University of York — In an ultra-intense laser interaction with a solid, the electrons from the hot plasma are accelerated by the laser streaming into the solid behind, creating a dense plasma in the bulk. This provides a laboratory for creating warm dense matter in a parameter range where the material resistivity and equation of states are complex and mostly untested. Here we describe an experimental study of electron transport in a low atomic number (plastic) material at solid density and temperatures of 200 eV. The plastic is doped with sulphur as a diagnostic tracer to enable the observation of emission spectra. Through observing high positive polarisation in this emission it is possible to infer *in situ* anisotropic currents driving the heat transport. Matching the current anisotropy enables tests of resistivity models in these complex plasmas. Results show that the background resistivity at these conditions is high than expected from commonly used models.

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