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Laboratory measurements of the resistivity of warm dense plasmas NICOLA BOOTH, ALEX ROBINSON, Central Laser Facility, STFC Rutherford Appleton Laboratory, PETER HAKEL, University of Nevada, GINALUCA GREGORI, University of Oxford, PATTATHIL RAJEEV, Central Laser Facility, STFC Rutherford Appleton Laboratory, NIGEL WOOLSEY, University of York — In this talk we will present a method for studying material resistivity in warm dense plasmas in the laboratory in which we interrogate the microphysics of the low energy electron distributions associated with an anisotropic return current. Through experimental measurements of the polarization of the Ly- α doublet emission ($2s_{1/2}$ – $2p_{1/2,3/2}$ transitions) of sulphur, we determine the resistivity of a sulphur-doped plastic target heated to warm dense conditions by an ultra-intense laser at relativistic intensities, $I \approx 5 \times 10^{20} \text{Wcm}^{-2}$. We describe a method of exploiting classical x-ray scattering to separately measure both the π - and σ - polarizations of Ly- α_1 spectral emission in a single shot. These measurements make it possible to explore fundamental material properties such as resistivity in warm and hot dense plasmas through matching plasma physics modelling to atomic physics calculations of the experimentally measured large, positive, polarisation.

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