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Time evolution of transient plasma states from nanowire arrays irradiated at relativistic intensities O.S. HUMPHRIES, University of Oxford, P. ALLAN, C.R.D. BROWN, L.M.R. HOBBS, S.F. JAMES, M.G. RAMSAY, B. WILLIAMS, D.J. HOARTY, M.P. HILL, AWE, S.M. VINKO, University of Oxford
— Understanding the evolution of extreme states of matter driven by relativistic laser-plasma interactions is a fundamental problem in high-field physics. This is especially true for nanostructured targets, where hydrodynamic effects play a key role within the ultra-fast time scale of laser absorption. Nanowire array targets are of particular interest as they provide an efficient means to access the ultra-high-energy-density regime due to their increased optical absorption, and have been shown to act as very efficient x-ray emission sources. I will present analysis of time-resolved x-ray emission spectroscopy from petawatt-irradiated Nickel nanowire arrays, used to characterise the conditions achieved when scaling the performance of nanowire targets to relativistic intensities. A full time evolution of the plasma conditions is extracted from the experimental data, and shows good agreement with the physical interaction picture developed by prior computational studies.

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