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Investigation of time-resolved fast electron dynamics in ultra-intense laser-solid interactions JAMES GREEN, ALEX ROBINSON, DEAN RUSBY, LUCY WILSON, Central Laser Facility, STFC, CHRIS MURPHY, University of Edinburgh, RACHEL DANCE, ROSS GRAY, DAVID MACLELLAN, PAUL MCKENNA, University of Strathclyde, CHRIS RIDGERS, University of York —
The study of fast electron transport in laser-solid interactions is crucial for many key applications. Laser-accelerated particle beams will require compact laser systems operating at high repetition rates, hence experimental effort to characterise acceleration processes using femtosecond laser sources is crucial. A thorough understanding of fast-electron acceleration and transport underpins the development of most of these applications, necessitating both temporally and spatially-resolved measurements. Here an overview will be presented of unique fast electron transport results from the Astra Gemini laser (10^{21} Wcm^{-2}, 40 fs). Using high resolution rear surface optical probing, together with complementary ion acceleration measurements, we have undertaken a study of the earliest stages of fast electron dynamics. How various target and laser parameters directly affected both the electron distribution and subsequent ion acceleration will be detailed, with computational modeling supporting the experimental observations.

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