Measurement and modelling of electrons and protons from 1-16ps.

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High-intensity laser-solid interactions are a bright source of energetic of electrons and protons (>MeV). The scaling and tuning of the accelerated protons has been studied for many years as a function of pulse duration, focal spot size and incident laser energy. Here, results of both the spectrum and flux of the accelerated protons and temperature and angular distribution of the escaping electrons are simultaneously measured as the duration of the laser is increased from 1-16 ps. As the pulse duration is increased, the peak electron and integrated proton signal increases. At even longer pulse durations the flux of both electrons and protons fall. Analytical modelling of each beam has been conducted; for the electrons a capacitor model has been used to describe the time-evolving electrostatic potential on the rear surface and the maximum proton energy is modelled using a plasma expansion model. Correlations between the experimental results and the analytical modelling for both the electron and proton flux will be present.