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## Mechanisms to control laser-plasma coupling in laser wakefield electron acceleration

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A laser wakefield experiment was performed at the Lund Laser Centre with the support of ARIES Transnational Access programme. In the context of the EuPRAXIA project it aimed to explore possible control mechanisms over laser-plasma coupling and the resulting trapping and acceleration dynamics of the produced electron bunches. Three main experimental parameters which have a large impact on the accelerated electrons properties were varied: the density downramp before plasma exit, the focal position of the laser within the plasma and the laser energy distribution through focus. Experimental results are in good agreement with particle-in-cell simulation results using realistic laser energy, phase distribution, and temporal envelope, allowing for accurate predictions of difficult to model parameters, such as total charge and spatial properties of the electron bunches, opening the way for more accurate modelling for the design of plasma-based accelerators.

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