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Ion-motion simulations of a plasma-wakefield experiment at FLASHForward

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In plasma-based acceleration, an ultra-relativistic particle bunch—or an intense laser beam—is used to expel electrons from its propagation path, forming a wake that is devoid of electrons. The ions, being significantly more massive, are often assumed to be stationary. However, both theory and simulations suggest that any sufficiently dense electron bunch can trigger ion motion, and its effect must be taken into account. We simulate beam-driven plasma wakefields to identify key features—such as longitudinally dependent emittance growth—that could be observed in an experiment using plasma and beam parameters from the FLASHForward facility at DESY.

Footnotes

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