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Optimization of laser-wakefield acceleration using ionisation-induced injection

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Ionization-induced injection is a promising scheme to achieve stable laser-plasma injectors with low energy spread (~10%) electron beams. This scheme is easy to implement experimentally and offers an additional parameter of control on electron beam properties for compact injectors in the 100 to 200 MeV range. Simulations were performed with realistic laser-plasma parameters using the pic code Warp, to study the influence of N₂ concentration in the plasma on the generated electron beam properties. We will show that there is an optimum value of concentration for the considered laser-plasma parameters, allowing to maximize the accelerated charge, and minimize emittance and energy spread.

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