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Chirp Mitigation of Plasma-Accelerated Beams by a Modulated Plasma Density

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Plasma-based accelerators offer the possibility to drive future compact light sources and high-energy physics applications. Achieving good beam quality, especially a small beam energy spread, is still one of the major challenges. Here, we propose to use a periodically modulated plasma density to actively shape the longitudinal fields acting on an electron bunch in the linear wakefield regime. We show, that we can generate an on-average flat accelerating field that suppresses the energy chirp evolution and thus maintains a small beam energy spread. The general concept of a modulated plasma density offers further advantages that we will discuss.

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