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Filtering of higher-order laser modes using plasma structures¹ DJORDJEVIC, BLAGOJE University of California, Berkeley, CARLO BENEDETTI, CARL SCHROEDER, ERIC ESAREY, WIM LEEMANS, Lawrence Berkeley National Laboratory — Plasma structures based on leaky channels are proposed to filter higher-order laser mode content. The evolution and propagation of non-Gaussian laser pulses in leaky channels is studied, and it is shown that, for appropriate laser-plasma parameters, the higher-order laser mode content may be removed while the fundamental mode remains well-guided. The behavior of the multi-mode laser pulse is described analytically, including the derivation of the leakage coefficients, and compared to numerical calculations. Gaussian laser pulse propagation, without higher-order mode content, improves guiding in parabolic plasma channels, enabling extended interaction lengths for laser-plasma accelerator applications.

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