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Emittance preservation of a CO₂-laser driven wakefield acceleration with external injection

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We explore the possibility of self-guided CO₂-laser driven wakefield accelerator with external injection from a linear accelerator. Since long-wavelength CO₂ laser pulse enables a lower power threshold for self-guiding, nonlinear LWFA at a lower plasma density with larger wakefield size can be achieved, making longer acceleration and external injection easier. We aim to find the optimal conditions for emittance preservation of externally injected electrons with simulations. We'll discuss different ways that the emittance of externally injected electron beams can be impacted during cm scale propagation, including density ramp and injection phase. This will provide guidance for future experiments conducted at ATF facility in the Brookhaven National Laboratory.

Acknowledgments

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