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Investegation of Laser wakefield acceleration through numerical modeling

Laser Wakefield Accelerators (LWFA) introduce a novel mechanism [1] for generating high-energy electron beams. Laser plasma interaction in an under dense gas generates plasma waves with accelerating fields orders of magnitude greater than the ones supported by radiofrequency cavities in conventional accelerators.
Further research is required to generate a more charged electron bunches with low energy spread, and low emittance suited for a variety of applications like the radiation therapy [2], free electron lasers, and future compact colliders.
Numerical modeling is a powerful method to analyze and design the optimum laser and plasma parameters for LWFA experiments. A brief overview of fluid and kinetic LWFA description models and numerical SMILEI simulations for future LWFA experiments by the ITFIP team (LPGP) is presented.

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