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Optimization study of a transport line for laser-plasma generated electron beams

The need of conceiving a transport line for laser-generated beams of electrons comes from the fact that these beams quickly lose their remarkable characteristics, such as the transverse normalized emittance and beam dimensions, as soon as they exit the plasma medium.

Thus, in order to exploit these novel electron sources, proper devices must be designed, able to deliver beams to users preserving their quality. This would make them a competitive alternative to conventional accelerators based on RF technology.

The main reason of degradation lies in the high divergence and energy spread these beams present at the source, causing a difficult control which requires uncommon magnetic strengths.

We report on an optimization study related to the coupling of laser-accelerated electrons with conventional magnetic transport lines. We analyze different configurations and different beam energies. We point out and discuss the main problems arising by matching state-of-the-art laser-plasma electron beams with traditional accelerator facilities.

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