

Design of a quadripartite wakefield structure for free electron laser applications

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Wakefield structures are broadly employed in free electron laser (FEL) facilities for beam manipulation. Compared with cylindrical geometries, planar structures are typically preferred due to their increased flexibility, allowing for tunable wakefield strength through gap adjustment. However, these planar configurations can induce time-dependent quadrupole wakefields, which require careful compensation in various applications. To address this issue, we propose a novel structure design incorporating four identical corrugated elements which are independently controllable. By adjusting the gaps between orthogonal pairs, the quadrupole wakefield can be either fully compensated to avoid emittance growth or significantly amplified to enhance beam mismatch for slice lasing control. This manuscript presents both the physical and mechanical design of the proposed structure, as well as the planned proof-of-principle experiment.

Footnotes

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