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A w-band corrugated waveguide for wakefield acceleration at the AWA emittance exchange beamline

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High gradient radio-frequency structures are of considerable interest in ongoing structure wakefield acceleration research. The prospect of economical accelerators with a small footprint in the sub-terahertz regime shows promise in achieving high gradient and high efficiency, and in that vein, we present a design for a metallic corrugated waveguide designed at 110 GHz. This W-band structure has been optimized in the CST Studio Suite for the maximum achievable gradient of 84.6 MV/m from a nominal Argonne Wakefield Accelerator (AWA) electron bunch at 65 MeV, with a charge of 10 nC and an RMS length of 0.5 mm. When the developed structure is excited with a shaped electron bunch, higher gradient and longer beam propagation distance could be achieved. Simulations are ongoing to test the effects of bunch shaping on the structure's performance, and structure fabrication and cold tests are underway in preparation for a collinear wakefield acceleration experiment at AWA.

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Footnotes

I have read and accept the Privacy Policy Statement

Yes

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