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Design, fabrication, and testing of a W-band corrugated waveguide for Wakefield acceleration

Sunday, 19 May 2024 16:00 (2 hours)

In the field of structure wakefield acceleration there is considerable interest in radiofrequency (RF) structures capable of producing high gradients. Structures in the sub-terahertz (sub-THz) regime are of note due to their high gradient and high efficiency, allowing for a low physical footprint. In the pursuit of this goal we have designed a metallic corrugated W-band structure using the CST Studio Suite. After optimizing for the maximum achievable gradient from a nominal Argonne Wakefield Accelerator (AWA) electron bunch at 65 MeV with a Gaussian distribution we attempted to achieve a higher transformer ratio using a shaped bunch. Shaped bunches such as these are achievable at the AWA emittance exchange (EEX) beamline. Preliminary results from the structure testing at AWA using shaped electron bunches will be presented. Further tests are planned, involving a comprehensive optimization of the beamline at AWA.

Footnotes

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North America

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