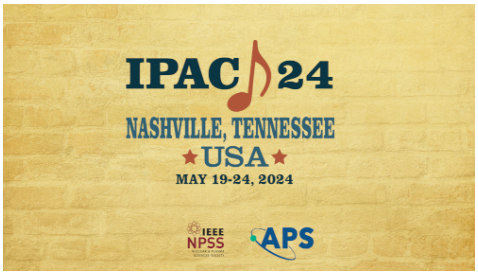

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High power experimental results of a multicell dielectric disk accelerating structure

Sunday, 19 May 2024 14:00 (4 hours)

A Dielectric Disk Accelerator (DDA) is a metallic accelerating structure loaded with dielectric disks to increase its shunt impedance. These structures use short RF pulses of 9 ns to achieve accelerating gradients of more than 100 MV/m. Single cell and multicell clamped structures have been designed and high power tested at the Argonne Wakefield Accelerator. During testing, the single cell clamped DDA structure achieved an accelerating gradient of 102 MV/m with no visible damage in the RF volume region. The minimal damage that was seen outside the RF volume was likely due to RF leakage from uneven clamping during assembly. Based on the success of that experiment, a clamped multicell DDA structure has been designed and tested at high power. Simulation results for this new structure show a 108 MV/m accelerating gradient with 400 MW of input power with high shunt impedance and group velocity. Engineering designs were improved from the single cell structure for a more consistent clamping over the entire structure. Up to this point in the high power experiments, the results show a peak input power of 222 MW correlating to an accelerating gradient of 80 MV/m. Testing of this structure will continue January 2024.

Footnotes

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