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## Fabrication and testing of mode couplers for a 180 GHz colinear wakefield accelerator

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A corrugated waveguide based collinear wakefield accelerator is under development at Argonne National Laboratory. The accelerating mode is operating at 180 GHz with a high average power level up to 600 W compounding at the end of the 0.5 m long accelerator module. It is extracted by a dedicated coupler to prevent excessive heating of the corrugated structure of the next accelerator module downstream. Also, it is necessary to monitor beam offsets from the center of the corrugated structure. It is done by utilizing the offset beam's induced wakefield dipole mode at 190 GHz and extracting it to diagnostic electronics via the second dedicated coupler. Both are contained in the transition section between the accelerator modules\*. This paper presents the mechanical design, fabrication, and performance testing of the transition section. Testing included mmWave measurements at ANL and electron beam measurements at Brookhaven National Lab's Accelerator Test Facility. Both tests involved characterizations of the wakefield modes and coupler's performances.

### Footnotes

- A. Siy, N. Behdad, J. Booske, G. Waldschmidt, and A. Zholents, "Electromagnetic design of the transition section between modules of a wakefield accelerator", *Phys. Rev. Accel. Beams* 26, 012802(2023), <https://journals.aps.org/prab/pdf/10.1103/PhysRevAccelBeams.26.012802>

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