

Abstract Submitted
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Progress on the Omniguide Traveling-Wave Tube Experiment

EVGENYA SIMAKOV, DALE DALMAS, LAWRENCE EARLEY, WILLIAM HAYNES, RICHARD RENNEKE, DMITRY SHCHEGOLKOV, Los Alamos National Laboratory, ISR-6 TEAM — A wide-band millimeter-wave traveling-wave tube (TWT) amplifier is being developed at Los Alamos National Laboratory. We have designed, fabricated, and tested a novel W-band traveling-wave tube (TWT) amplifier based on a slow-wave cylindrically-symmetric photonic band gap (PBG) structure, or an “omniguide.” The omniguide represents a one-dimensional periodic system of concentric dielectric tubes. The tubes were fabricated with silica dielectric and held with a copper waveguide input and output. Cold-test results were found to be in excellent agreement with the design demonstrating very large bandwidth. Hot-test results have yielded gain which is consistent with the theory. One concern with dielectric tubes was their susceptibility to damage when struck by electrons. Our experiments show no serious damage, even after hundreds of shots. Gain experiments are continuing at Los Alamos.

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