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Compact Low-Voltage, High-Power, Multi-beam Klystron for ILC: Initial Test Results

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Abstract:

Initial test results of an L-band multi-beam klystron with parameters relevant for ILC are presented. The chief distinction of this tube from MBKs already developed for ILC is its low operating voltage of 60 kV, a virtue that implies considerable technological simplifications in the accelerator complex. To demonstrate the concept underlying the tube's design, a six-beamlet quadrant (a 54" high one-quarter portion of the full 1.3 GHz tube) was built and recently underwent initial tests, with main goals of demonstrating rated gun perveance, rated gain, and at least one-quarter of the full 10-MW rated power. These tests, with 10-15 microsec RF pulses, confirmed the rated gain, produced output powers of up to 2.86 MW at 60 kV with high efficiency and 56 dB gain, and showed acceptable beam interception. These results suggest that a full version of the tube should be able to produce up to 11.5 MW. Our initial three-day conditioning campaign without RF drive (140 microsec pulses @60 Hz) was stopped at 53% of full rated duty because of time-limits at the test-site; no signs appeared that would seem to prevent achieving full duty operation (i.e., 1.6 msec pulses @10 Hz). Follow-on tests are planned for later in 2015.

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Oral or Poster Presentation

Oral

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