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Compact High Power RF Sources for Integrated Linear Accelerator Systems

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The RF Accelerator Research Division at SLAC is developing fully integrated linear accelerator systems for low energy applications, with a smaller footprint and higher efficiency than facility-scale accelerators. These systems are packaged as single units that include the high voltage power supply, RF sources, controls, and the linac structure itself. A considerable part of the effort is in developing high efficiency RF sources (klystrons) with minimal size and weight. Peak power for the klystrons is on the order of hundreds of kW per RF amplifier. Sources have been designed for X-band and C-band, with 60 kV beam voltage to eliminate the need for oil insulation and custom high voltage components. By developing a single "building block"topology of pulsed RF amplifiers with stable and repeatable phase and amplitude control, these compact klystrons could be deployed in small numbers for portable accelerator systems, or in mass produced arrays for powering larger-scale facilities for fundamental science. The intent is to enable a diverse set of applications using a common high power pulsed RF source topology, regardless of scale, to incentivize cost-effective RF power solutions via high volume production. In this presentation, a summary of SLAC's recent design and test developments in compact RF sources will be discussed.

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Footnotes

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