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Progress in the Design of a High-Gradient, THz-Driven Electron Gun[1] SAMANTHA LEWIS, MOHAMED OTHMAN, EMILIO NANNI, SAMI TANTAWI, SLAC National Accelerator Laboratory — High energy particle sources are in demand for a variety of applications. To limit the size and cost of these sources, high accelerating gradient is required. Vacuum breakdown limits the achievable gradient in normal conducting accelerators, but using THz-frequency structures could allow for compact, GV/m-scale devices. This work will present the design of standing-wave electron guns which utilize this principle. The gun cavities are machined from copper and operate in the pi-mode at 110 GHz. In the current design, electrons are field-emitted from a diamond cathode and accelerated to 400 keV in 2 mm. The device will be tested using a pulsed 110 GHz gyrotron in order to characterize the electron beam properties and collect breakdown statistics. Future designs will also be discussed, including a Cu cathode and possibilities for reaching 1 MeV.

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