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Electron-THz interaction in dielectric-lined waveguide deflecting structures

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Terahertz-driven dielectric-lined waveguides (DLWs) have uses in electron manipulation; in particular deflection, acceleration, and focussing. A rectangular DLW has been optimised for deflection of 100 keV electrons using a THz pulse with a centre frequency 0.5 THz. A narrowband THz pulse is generated using a lithium niobate crystal and chirped pulse beating. Electron-THz interaction and the effect of electron bunch injection timing on maximising deflection is presented, with a focus on beam dynamics. Structure design, including coupling from free-space into the DLW, has been completed and the practical aspects of operation are discussed. Finally DLWs and corrugated waveguides are compared to discuss relative advantages and disadvantages.

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