Compact Electron Beam Accelerator Driven by a High-Voltage Piezoelectric Transformer

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A compact electron beam accelerator driven by a lithium niobate piezoelectric transformer was used to produce beams with energies greater than 100 keV. Charge was directly extracted from the transformer output using field-electron emitters. Electric fields generated by the transformer accelerated the charge into a grounded metallic target. The resultant bremsstrahlung radiation was used as a direct measurement of beam voltage. Time-dependent analysis of the x-ray spectra showed that electron beam production was limited to approximately one-minute intervals. This limitation was attributed to the accumulation of surface charge at the transformer output.

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