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THz Autocorrelators for ps Pulse Characterization Based on Schottky Diodes and Rectifying Field-Effect Transistors

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Abstract

When operating Schottky diodes and rectifying field-effect transistors in the saturation regime, where they show a sublinear response to incident THz power, they can be used as fast autorcorrelators yielding information on the pulse envelope. We report on autocorrelation measurements at 3.41 THz of high-power THz pulses for determination of the pulse duration and pulse structure. By fringe-resolved measurements, the THz frequency of the pulse is also obtained. We develop a theoretical model for the rectification process and compare the performance of an antenna-coupled Schottky diode to a large-area field-effect transistor rectifier. While the Schottky diode saturates earlier and can therefore be used for autocorrelation measurements at lower input power, antenna-less large-area field-effect transistors can be used for highest power levels-even at free electron lasers-and turn out to be very robust.