Science Advances

Supplementary Materials for

Terahertz control and timing correlations in a transmission electron microscope

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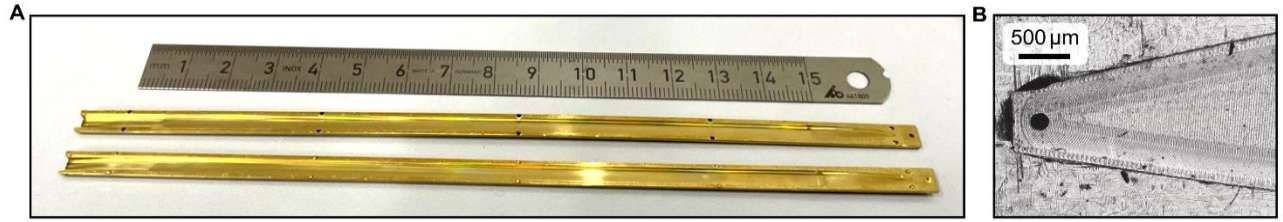**This PDF file includes:**

Figs. S1 to S6

Fig. S1.
Fabricated waveguide structures. **A,** Photograph of the upper and lower half. **B,** Optical microscope image of the terahertz-electron interaction region.
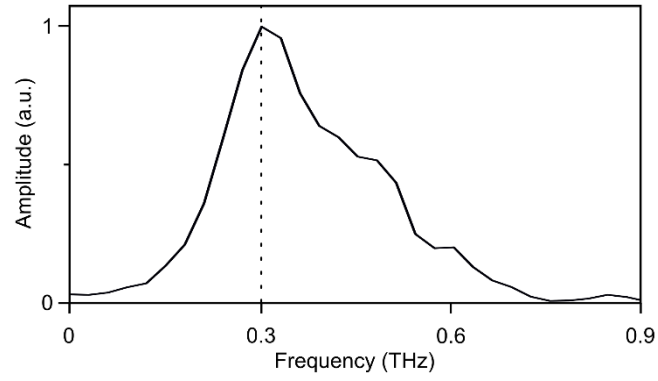
Fig. S2.

Terahertz spectrum obtained by Fourier transformation of the measured electron energy modulation as shown in Fig. 2A.
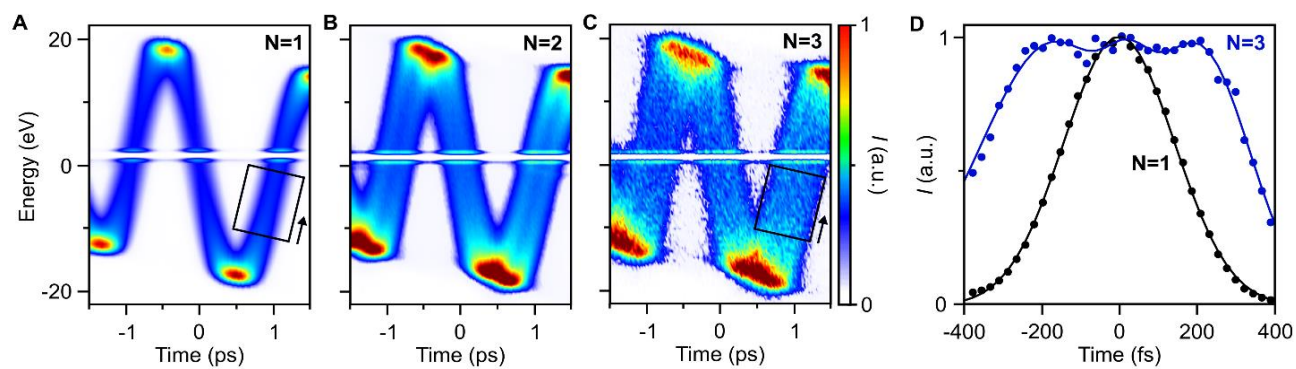
Fig. S3.

Three-electron correlations. **A-C,** Measured energy spectrograms for one-electron states (N = 1), for two-electron states (N = 2) and for three-electron states (N = 3). Black rectangle, region of interest for further analysis. **D,** Evaluated electron arrival times (sum of the spectrogram along the black rectangle) for N = 1 (black) and N = 3 (blue). Dots, experimental data; solid lines, Gaussian fits.
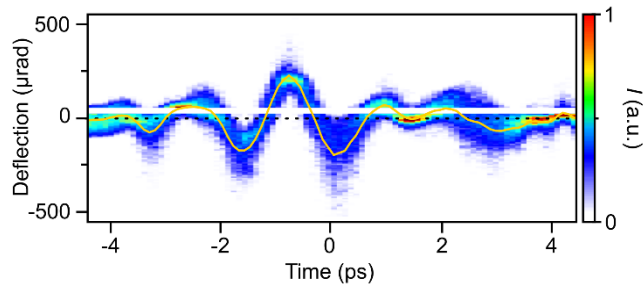
Fig. S4.

Raw data of the deflection trace shown in Fig. 2B. For each time step, we evaluate the beam position as the weighted centroid of the measured intensity profile (yellow).
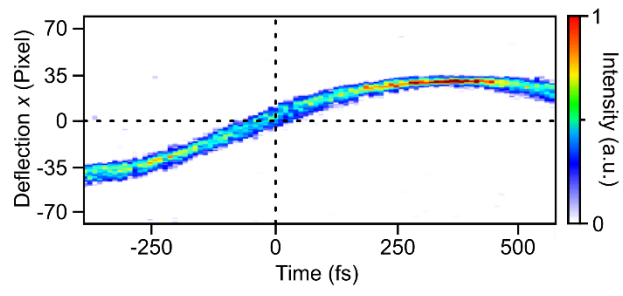
Fig. S5.

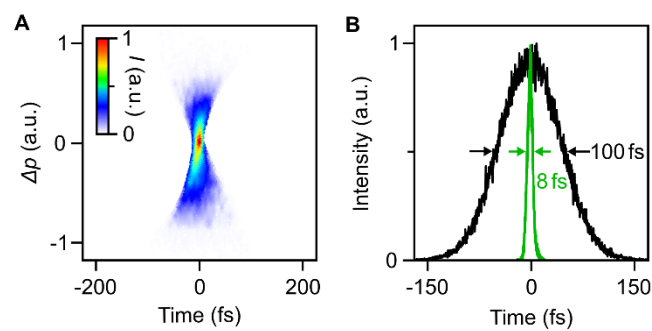Example for a streaking trace at a shifted defocus.

Fig. S6.

Numerical simulation of terahertz pulse compression for shorter initial pulses. **A,** Resulting longitudinal phase space in the momentum-time domain at the temporal focus for input pulses of 100 fs duration. **B,** Simulated temporal pulse profile before (black) and after (green) terahertz compression.