

Double-slit time diffraction at optical frequencies

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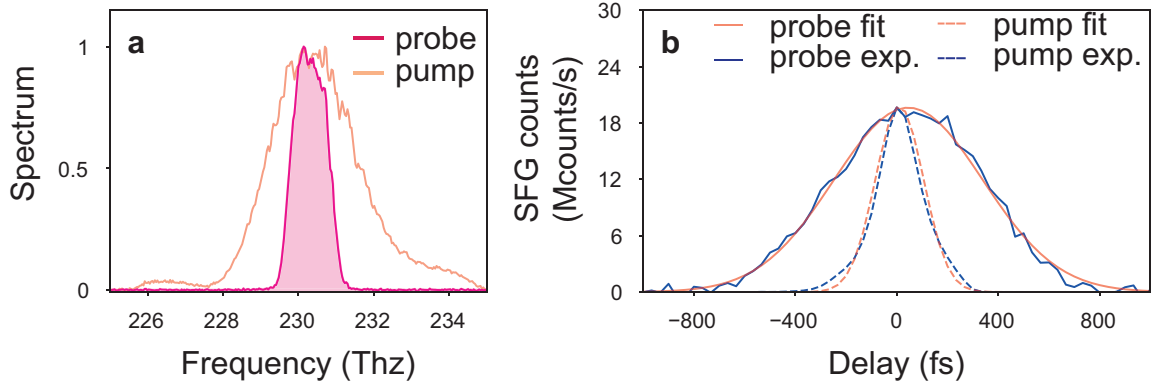


Figure 1: Characterization of the probe pulse temporal width. **a** Measured original pump spectrum (beige) and spectrally filtered probe spectrum (pink) used for the double slit experiment. **b** Cross-correlation of the probe-pump pulses obtained from sum-frequency generation (SFG) as a function of probe to pump delay: experimental (continuous blue) against fitted analytical theory for a gaussian pulse (continuous red). The autocorrelation of the pristine pump is shown for comparison (blue dashed for experiment, red dashed for theory), normalized to the intensity of the probe cross correlation signal.

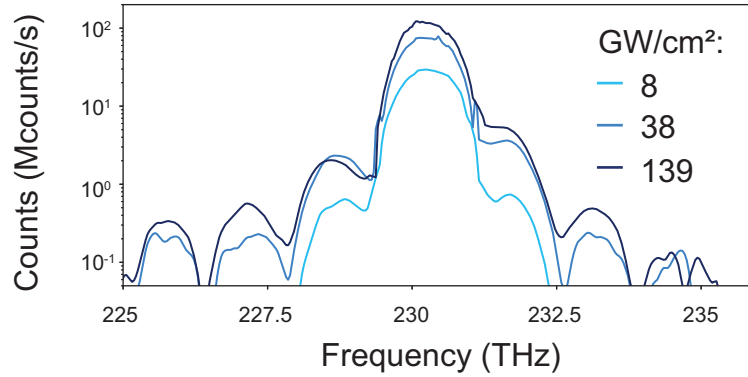


Figure 2: Pump intensity dependence of the diffraction spectrum. Spectral oscillations are not visible at low (light blue), then appear for medium (blue) and are prominent high (dark blue) intensity. Counts are on a logarithmic scale.

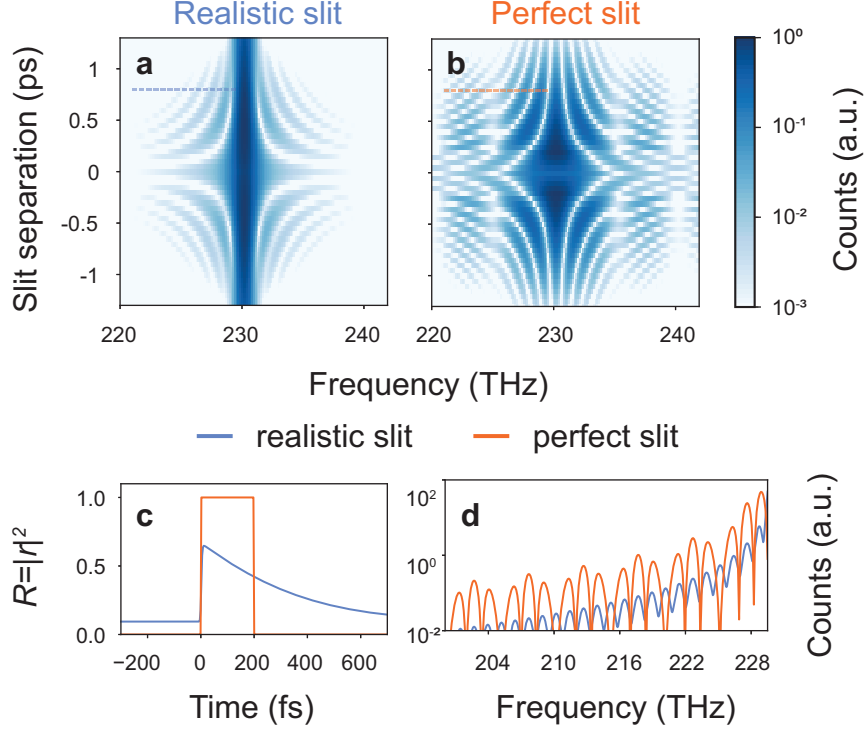


Figure 3: Effect of the slit shape on the diffraction pattern. **a,b** Comparison of the interferograms resulting from a slit as described and modelled in the Methods section (a) and a rectangular with a width of 200 fs (b). The latter exhibits the sinc-shaped pattern expected from a double slit in Fourier theory. The dashed lines in panels a and b show the line cut where data in d is shown. **c** Reflectivity as a function of time as modelled for the current model (light blue) and the perfect slit (orange). **d** Diffraction pattern in frequency for the two models on a logarithmic scale: the period is independent of the slit shape, but the perfect slit envelope shows a sinc behaviour over-imposed on the oscillations.

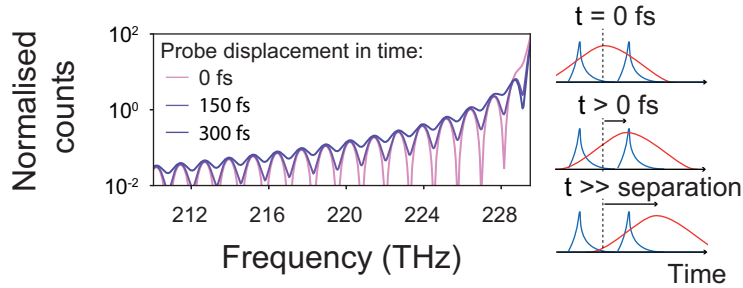


Figure 4: Dependence of the spectral oscillations on the temporal probe offset. Modelled counts against frequency on a logarithmic scale, with an offset varying from 0 fs (light pink) corresponding to the top diagram on the right, i.e. centered between the slits, and 300 fs (purple) i.e. seeing a slit much more strongly than the other as shown in the bottom diagram.