

Supplementary Information

Impact of Sub-Picosecond Timing Errors on Complex Conductivity Extraction in Terahertz Time-Domain Spectroscopy of Ultrathin FAPbI₃ Films

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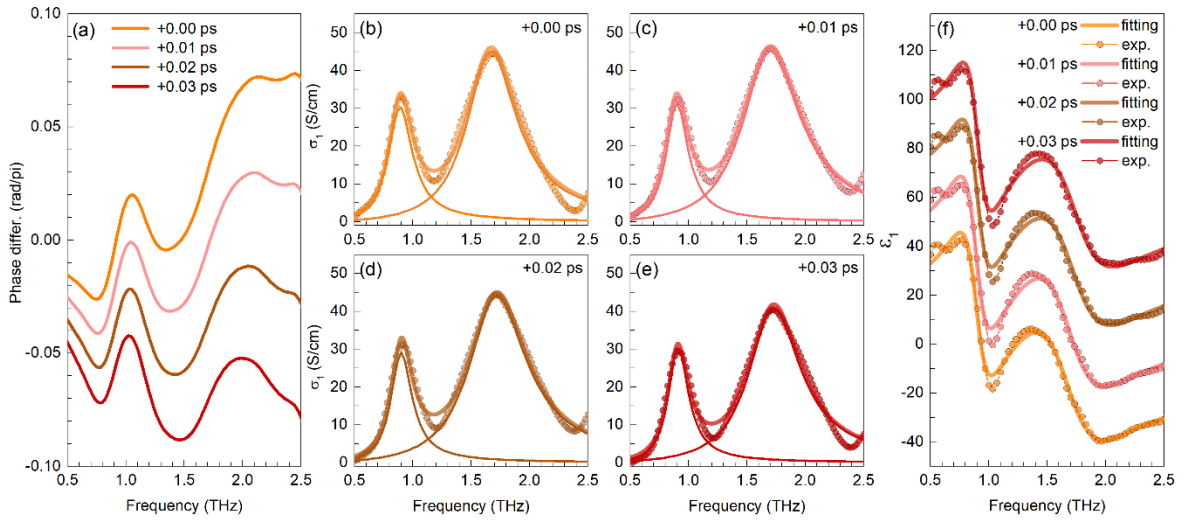


Figure S1. Lorentz oscillator model fitting of the extracted optical properties. (a) Phase difference spectra showing the effect of temporal shifts on the transmission phase. (b-e) Extracted real part of the complex conductivity (dotted lines) and the corresponding Lorentz oscillator model fits (solid lines) for Sample 1 before and after timing-error correction (+0.00 ps (b), +0.01 ps (c), +0.02 ps (d), +0.03 ps (e)) (dotted lines) (f) Extracted real part of the dielectric constant (dotted lines) and the corresponding Lorentz oscillator model fits (solid lines) before and after the timing-error correction.

		ω_0 (THz)	ω_p (THz)	γ (THz)	ϵ_{DC}	ϵ_∞
Sample 1 +0.00 ps	$j=1$	0.89	0.37	0.25	-13.4	-13.7
	$j=2$	1.67	0.65	0.52		
Sample 1 +0.01 ps	$j=1$	0.9	0.36	0.23	8.6	8.3
	$j=2$	1.7	0.7	0.6		
Sample 1 +0.02 ps	$j=1$	0.9	0.34	0.22	32.8	32.5
	$j=2$	1.72	0.69	0.6		
Sample 1 +0.03 ps	$j=1$	0.91	0.34	0.21	56.4	56.1
	$j=2$	1.73	0.63	0.54		

Table S1. Lorentz harmonic oscillator parameters extracted from THz transmission spectra. Resonance frequency (ω_0), oscillator strength (ω_p), damping constant (γ), DC dielectric constant (ϵ_{DC}) and high-frequency dielectric constant (ϵ_∞) obtained from fitting the real part of the complex conductivity and dielectric constant spectra of Sample 1 before and after timing corrections (+0.00 ps, +0.01 ps, +0.02 ps, +0.03 ps).