Supplementary Information for:

Extreme Ultraviolet Time-Resolved Photoelectron Spectroscopy of Adenine, Adenosine and Adenosine Monophosphate in a Liquid Flat Jet

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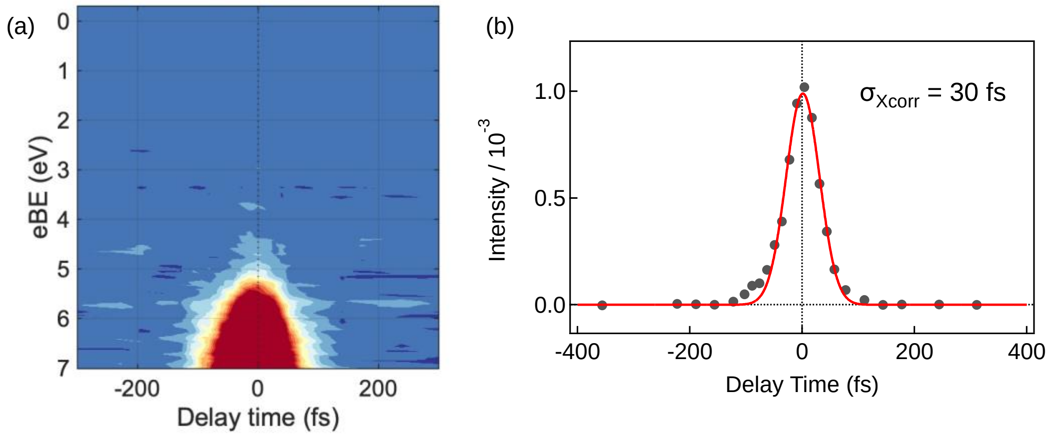

Figure S1. (a) Contour plot of TRPE spectrum of H_2O background (NaCl 25 mM) under the irradiation of 266-nm pump pulse at 2 μJ/pulse. The feature at 5-7 eV at t=0 is LAPE of the liquid water. (b) Time profile averaged over 5-7 eV. The fitting result with the Gaussian function is also shown as a red solid line.

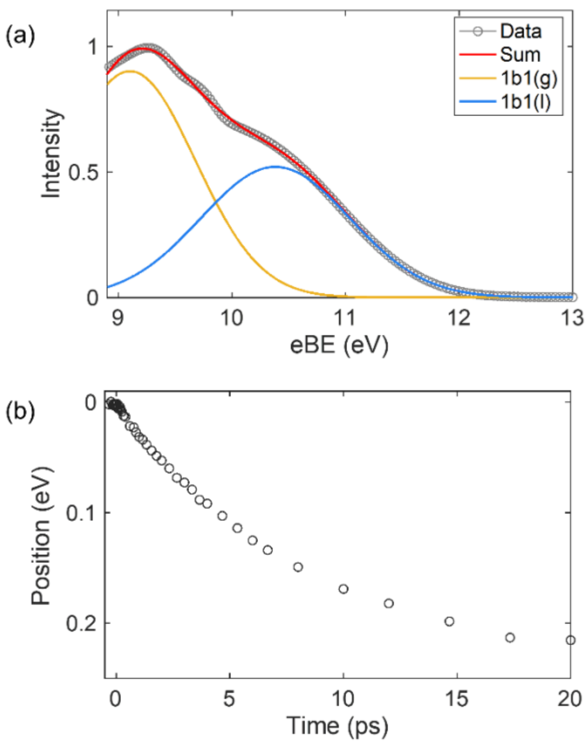

Figure S2. Correcting for space charge effects. (a) Example of the double-Gaussian fit to $1b_1$ water peak from Ado solution under 400-µW pump intensity. (b) Shift of the $1b_{1(l)}$ peak position as a function of the delay time.

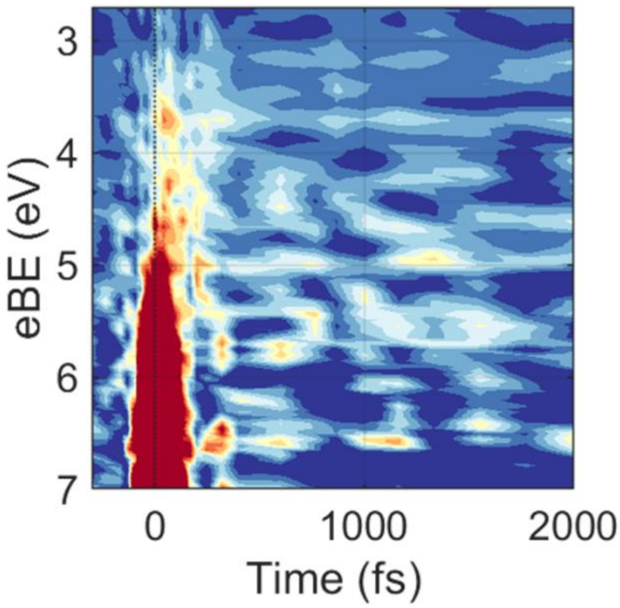

Figure S3. Contour plot of the TRPE spectrum of AMP without spectral and temporal smoothing.

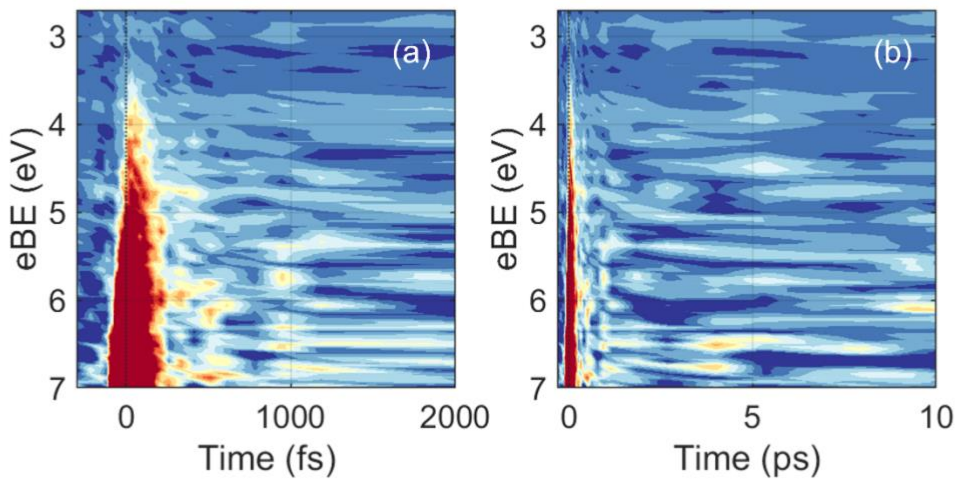

Figure S4. Contour plot of the TRPE spectrum of Ade at (a) short and (b) long time delay without smoothing.

Temporal boxcar smoothing for AMP

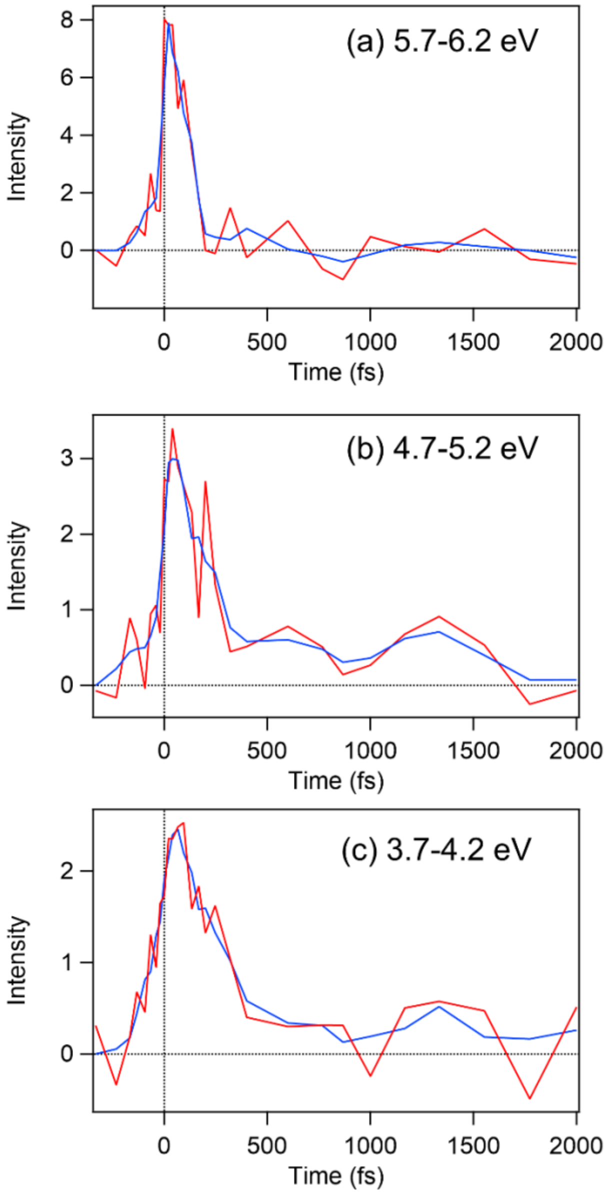

Figure S5. Temporal profiles of AMP at several eBEs with a 3-point boxcar averaging (blue) and without any smoothing (red).

Evaluation of the GLA analyses

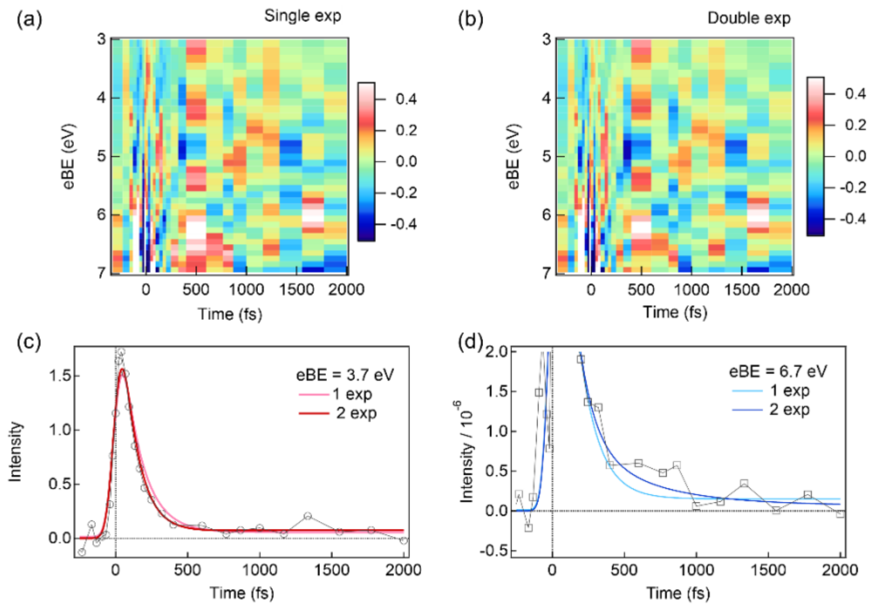

Figure S6. (a) Residual of the GLA analysis of Ado obtained under (a) the monoexponential functions and (b) the biexponential functions. (c,d) Time evolution at (c) 3.7 eV and (d) 6.7 eV with the two different GLA results.

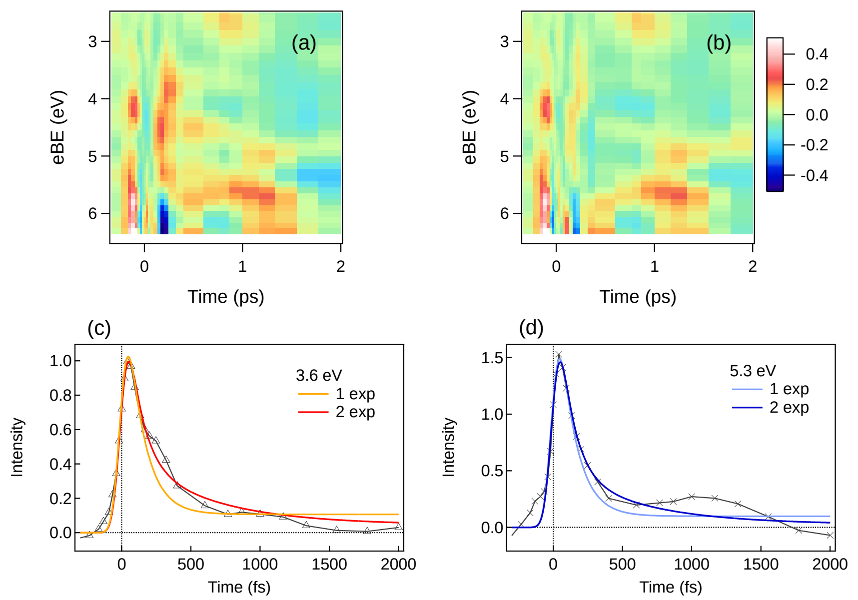

Figure S7. Residual plots of GLAs for AMP under (a) the monoexponential functions and (b) the biexponential functions. (c,d) Time evolution at (c) 3.6 eV and (d) 5.8 eV with the two different GLA results.

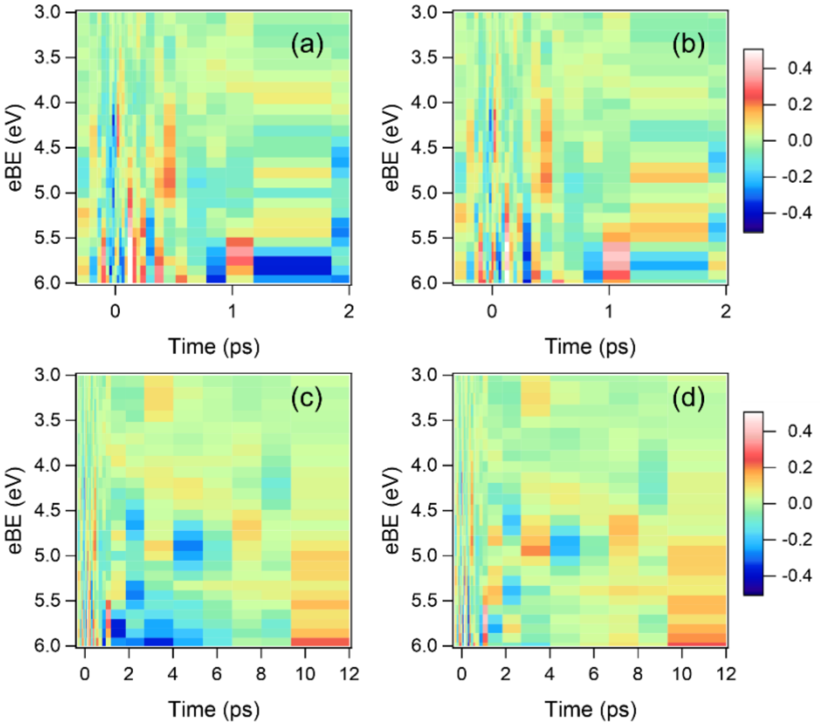

Figure S8. Residual plots of GLAs for Ade in (a) monoexponential decays and (b) biexponential decays out to 2 ps. Residuals out to 12 ps are shown in (c) and (d)**.**

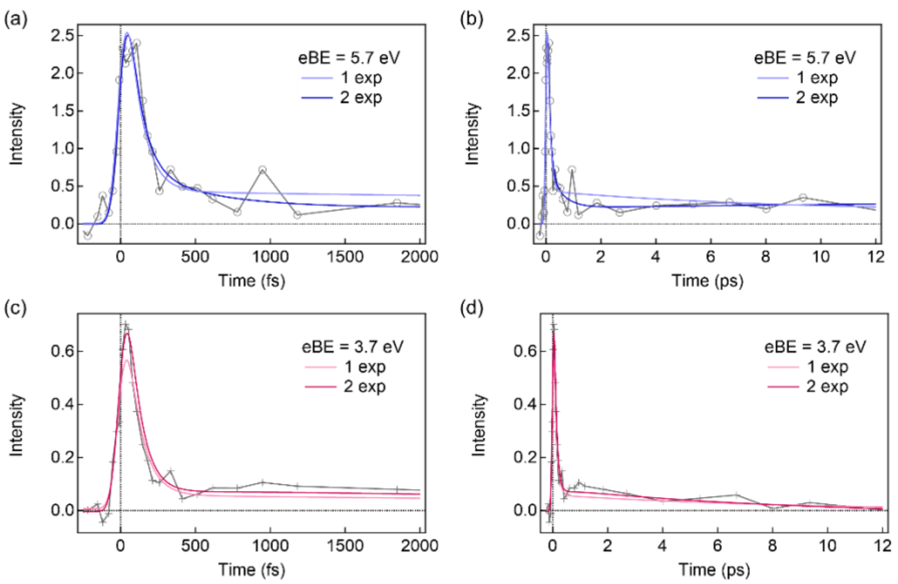

Figure S9. Time evolutions of Ade at (a,b) 5.7 eV and (c,d) 3.7 eV. The GLA result under mono- and biexponential functions are also shown.

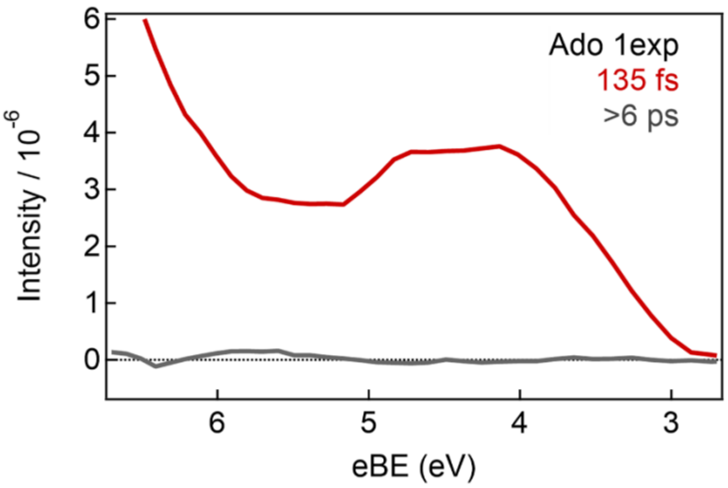

Figure S10. DAS for Ado obtained after GLA under monoexponential function.

Ultrafast Decay Analysis for AMP

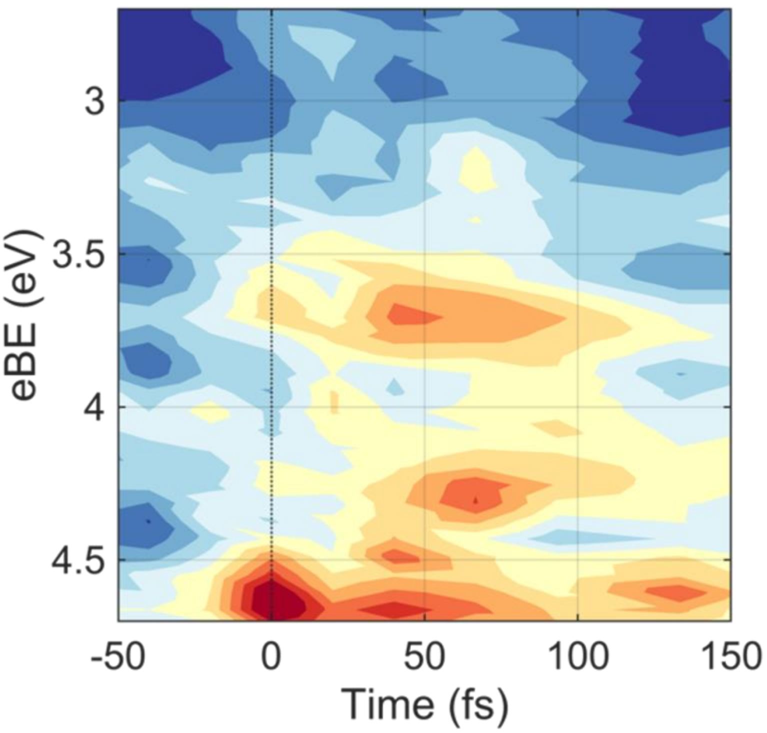

Figure S11. Contour plot for AMP without smoothing around t = 0.

Table S1. Lifetimes of the excited state signals (in ps) in different time-resolved measurements in aqueous solution near-266-nm excitation

Method	λ_{ex} (nm)	Ado	AMP	Ade	Ref.
XUV-TRPES (This work)	266	0.11, 0.47	0.10, 0.56	0.09, 0.48, 9.0	
TA	263	0.29			Pecourt (2001)[1, 2]
FU	270	0.53	0.52		Peon (2001)[3]
FU	267	<0.1, 0.5[a]	<0.1, 0.5[b]	0.23, 8.0	Gustavsson (2002)[4]
FU	255	<0.1, 0.42[a]	<0.1 0.52[b]		Onidas (2002)[5]
TA	263			0.18, 8.8	Cohen (2003)[6]
FU	265[c]	0.32		0.55, 8.1	Pancur (2005)[7]
TA, KTRF	267	0.13, 0.45			Kwok (2006)[8]
UV-TRPES[d]	266	0.21		0.064, 8.5	Buchner (2013)[9]
FU	267	0.11-0.27[e]			Gustavsson (2013)[10]
FU	260		0.32[b]		Stuhldreier (2013)[11]
TA	266			0.20, 5.4	Roberts (2014)[12]
UV-TRPES[f]	250-264	0.21-0.24	0.22-0.25		Williams (2018)[13]

[a]dA. [b]dAMP. [c] They reported lifetimes under various λ_{ex} around 245-280 nm and λ_{pr} around 300-330 nm. [d] λ_{pr} = 5.2 eV. [e] Obtained at various λ_{pr}: 310-380 nm. [f] λ_{pr} = 6.2 eV.

References

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