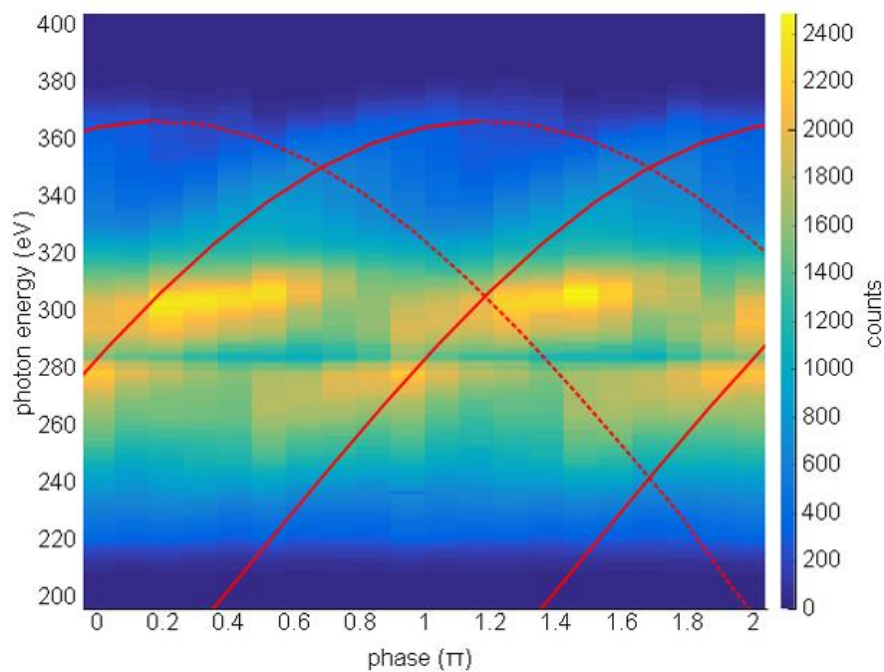


## ***High-harmonic generation with intense 1.8 $\mu\text{m}$ pulses - spectroscopy and water-window attosecond bursts***

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Millijoule-level ultrashort pulses in the 1.5-2.5 micron spectral region are ideal for extending the cutoff in high-order harmonic generation (HHG). I will present two of our recent efforts towards using such pulses to measure few-femtosecond dynamics. (i) Comparison of HHG spectra produced in benzene and xenon across a range of laser intensities indicates damping of the HHG emission in benzenes within a few femtoseconds of strong-field ionization. Likewise we observe subtle differences between the spectra produced in benzene and its methyl and halo substituted forms which can be connected to the participation of multiple cation states. (ii) We produce isolated sub-femtosecond bursts covering the water window (284-532 eV) by compressing 1.8 micron pulses to the few-cycle limit and driving HHG in a high-pressure helium or neon target. As a step towards transient spectroscopy, we use this source to obtain static spectra at the sulfur L-edge and carbon K-edge in polythiophene films.



Harmonic spectra obtained whilst scanning the carrier-envelope phase of the drive field. The red lines are classical trajectory fits to the half-cycle cut-offs.