# Characterization of partially coherent ultrashort XUV pulses

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Modern ultrafast metrology relies on the postulate that the pulse to be measured is fully coherent, i.e. that it can be completely described by its spectrum and spectral phase. However, partial coherence can arise if the pulse varies in degrees of freedom that are averaged out during the measurement process (eg. shot-to-shot pulse fluctuations, the pulse space-time structure, or details of the pulse finer than the detector resolution). Therefore, fully coherent pulses are not always available in practice, especially in the domain of emerging ultrashort XUV sources where temporal metrology is strongly needed.

To sort out this issue, we have adapted Frequency-Resolved Optical Gating (FROG), the first and one of the most widespread techniques for pulse characterization, to enable the measurement of partially coherent XUV pulses even down to the attosecond timescale [1]. The technique has been successfully implemented on a high-harmonic beamline in CEA Saclay, which allowed the characterization of the complete state of coherence of an attosecond pulse train. Experimental results will be presented along with a theoretical study to explain the potential origins of the observed loss of coherence.

1. C. Bourassin-Bouchet and M.E Couprie, *Nat. Commun.* 6:6465 (2015).