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Direct Measurement of the XUV Frequency Comb Coherence[1]
CRAIG BENKO, THOMAS K. ALLISON, ARMAN CINGOZ, DYLAN C. YOST, JUN YE, JILA, NIST, University of Colorado, Boulder — We present the first demonstration of XUV radiation with phase coherence capable of reaching sub-kHz resolution. The XUV comb is produced by frequency up conversion of a near-infrared frequency comb by intra-cavity high harmonic generation (HHG). Using an 80 W Yb:fiber fs frequency comb, we simultaneously pump two femtosecond enhancement cavities to reach intensities suitable for HHG. The harmonics are out-coupled from the cavities using sapphire plates placed at Brewster angle for the pump laser. We developed an interferometer capable of operating in the XUV and measured a heterodyne beat between the two sources at different harmonics. Despite being insensitive to common-mode pump laser noise, the heterodyne beats will reveal any noise added by the intra-cavity HHG process. This will allow us to probe the fundamental limit on the coherence properties of HHG.

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Craig Benko
JILA, NIST, University of Colorado, Boulder

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