Abstract Submitted
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Attosecond Science at the Linac Coherent Light Source[1] JAMES CRYAN, SIQI LI, TARAN DRIVER, JORDAN O'NEAL, ELIO CHAMPENOIS, JOSEPH DURIS, AGOSTINO MARINELLI, SLAC National Accelerator Laboratory, LS05 COLLABORATION, LU00 COLLABORATION — We report the first results using isolated attosecond soft X-ray pulses from an X-ray free-electron laser (XFEL)[2]. This new attosecond source produces peak powers on the gigawatt scale,and opens the door for a suite of X-ray spectroscopies probing few- to sub-femtosecond dynamics. High peak power pulses facilitate nonlinear spectroscopies such as attosecond X-ray pump/attosecond X-ray probe, and wave mixing. Moreover, the inherent tunability of an XFEL source allows the selective probing of different core-to-valence transitions at disparate atomic site in a molecule, providing an atomic site-specific probe of valence electron dynamics. We present single-shot attosecond pulse characterization, the preparation of a coherent electronic wavepacket *via* stimulated X-ray Raman scattering, time-resolved photoemission studies of pre-edge (resonant Auger) and post-edge (direct) K-shell ionization and two-color, two-pulse operation.

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[2]Duris, Li *et al.*, Nat. Phot. **14**, 30 (2020)

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