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**Sweeping the carrier-envelope phase of grating based chirped pulse amplifiers** CHENGQUAN LI, ERIC MOON, MAHENDRA SHAKYA, MASHIKO HIROKI, HE WANG, CHRISTOPHER NAKAMURA, JASON TACKETT, ZENGHU CHANG, J. R. MacDonald Laboratory, Department of Physics, Kansas State University — As a well-developed technique, grating based chirped pulse amplification (CPA) can generate high power laser pulses with durations longer than 10 fs, which can be further compressed to  $\sim 5$  fs. For such intense, few-cycle pulses, it is crucial to control their carrier-envelope (CE) phase for strong field atomic physics studies. Conventionally, the CE phase of few-cycle pulse was varied by a wedge pair while the CE phase of the pulses from the CPA was stabilized. In this work, we focus on studying the effects of the stability of the grating separation in the stretcher and compressor on the CE phase variation. By feedback controlling the effective distance between two gratings in the stretcher, the relative CE phase of the amplified pulses was stabilized with a 180 mrad rms error. Furthermore, by smoothly changing the locking reference, the relative CE phase was swept through a  $2\pi$  range. The sweeping method was confirmed by the XUV spectrum generated by polarization gating. The correlation between the relative CE phase and the high harmonic peak energy showed a  $\pi$  period, which agreed very well with theory.

- Prefer Oral Session  
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