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Optimizing High Harmonic Generation for X-ray Free Electron Laser Seeding[1] ELIO CHAMPENOIS, University of California, Berkeley, JAMES CRYAN, RAFAL RAKOWSKI, ALI BELKACEM, ROGER FALCONE, Lawrence Berkeley National Lab — As the next generation of free electron lasers (FELs) are being designed and built, one problem that is being addressed is that of the temporal and spectral instabilities inherent to an initially spontaneous process. High harmonic generation (HHG) has emerged as a means to generate vacuum and extreme ultraviolet (VUV, EUV) photon fluxes high enough to overcome spontaneous noise, making it a candidate for seeding of FELs. We are developing an HHG beamline that maximizes the absolute photon flux in the 30–60 eV range where a high gain harmonic generation FEL could be seeded. The HHG drive laser for our source operates at 1 kHz, with ∼30 mJ pulses compressed to 27 fs and loosely focused into a gas cell. We investigate the effects of shaping the driving electric field on the HHG process. We discuss the challenges associated with this high average power setup and our current results from optimizing harmonic yield.

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Elio Champenois
University of California, Berkeley

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