Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Extreme-ultraviolet ultrafast ARPES at high repetition rates JAN BUSS, HE WANG, YIMING XU, SEBASTIAN STOLL, LINGKUN ZENG, STEFAN ULONSKA, JONATHAN DENLINGER, ZAHID HUSSAIN, CHRIS JOZWIAK, ALESSANDRA LANZARA, ROBERT KAINDL, Lawrence Berkeley National Laboratory — Time- and angle-resolved photoemission spectroscopy (trARPES) represents a powerful approach to resolve the electronic structure and quasiparticle dynamics in complex materials, yet is often limited in either momentum space (incident photon energy), probe sensitivity (pulse repetition rate), or energy resolution. We demonstrate a novel table-top trARPES setup that combines a bright 50-kHz source of narrowband, extreme ultraviolet (XUV) pulses at 22.3 eV with UHV photoemission instrumentation to sensitively access dynamics for a large momentum space. The output of a high-power Ti:sapphire amplifier is split to provide the XUV probe and intense photoexcitation (up to mJ/cm^2). A vacuum beamline delivers spectral and flux characterization, differential pumping, as well as XUV beam steering and toroidal refocusing onto the sample with high incident flux of 3x10^{11} ph/s. Photoemission studies are carried out in a customized UHV chamber equipped with a hemispherical analyzer (R4000), six-axis sample cryostat, and side chambers for sample loading, storage and preparation. An ARPES energy resolution down to 70 meV with the direct XUV output is demonstrated. We will discuss initial applications of this setup including Fermi surface mapping and trARPES of complex materials.

Jan Buss
Lawrence Berkeley National Laboratory

Date submitted: 06 Nov 2015 Electronic form version 1.4