Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Towards jitter-free time resolved measurements at Xray Free Electron Lasers GILLES DOUMY, Argonne National Laboratory, CHRIS ROEDIG, KAI-KAI ZHANG, PIERRE AGOSTINI, LOU DIMAURO, Ohio State University, ADRIAN CAVALIERI, IVANKA GRGURAS, Center for Free Electron Laser science/ DESY, MICHAEL MEYER, European XFEL, JOHN COSTELLO, Dublin University, WOLFRAM HELML, REINHARD KIENBERGER, MPQ Garching, CHRISTOPH BOSTEDT, SEBASTIAN SCHORB, RYAN COFFEE, LCLS / SLAC National Accelerator Laboratory — The advent of X-ray Free Electron Lasers (XFEL) has quickly revolutionized the field of time resolved x-ray techniques. The availability of tunable pulses ranging from the soft to the hard x-ray region, and lasting only few tens of femtoseconds is enabling access to unprecedented temporal resolution using classic pump-probe techniques. Temporal resolution limits arise in large part from the timing jitter that exists inevitably between two independent sources. A significant effort to measure the timing jitter for every shot, tag the shots depending on the relative delay, and perform post sorting analysis of the data has yielded a precision around 25 fs (FWHM), a considerable improvement over the uncorrected jitter(400-500 fs (FWHM)). Importing the laser streaking techniques developed by the attophysics community, one can hope to use photoelectrons produced during the ultrashort x-ray pulse to define a reference to an external optical field, allowing extraction of the dynamics of a process of interest triggered by the x-ray pulse, using streaking by the same field.

Gilles Doumy
Argonne National Laboratory

Date submitted: 28 Jan 2014 Electronic form version 1.4