Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Study of double core holes in CO molecules created by intense short free electron laser pulses LI FANG, BRENDAN MURPHY, TIMUR OSIPOV, NORA BERRAH, Physics Department, Western Michigan University, USA, EDWIN KUKK, Department of Physics and Astronomy, University of Turku, Finland, MOTOMICHI TASHIRO, MASAHIRO EHARA, IMS, Japan, KIYOSHI UEDA, IMRAM, Tohoku University, Japan, KEVIN. C. PRINCE, ROBERT RICHTER, Sincrotrone Trieste S.c.p.A., Italy, RAIMUND FEIFEL, Department of Physics and Astronomy, Uppsala University, Sweden, PETER SALEN, PETER VAN DER MEULEN, HENNING SCHMIDT, RICHARD D. THOMAS, MATS LARSSON, Department of Physics, Stockholm University, Sweden — The intense short x-ray laser pulses from the Linac Coherent Light Source sequentially double core-ionize CO molecules within the time scale of the Auger decay of the single-core-hole state, producing double core holes. We will present the evidence of double core holes located at different atomic sites in CO molecules via both Auger and photoelectron spectroscopy. The spectral features corresponding to the double core holes are consistent with our theoretical calculations, showing evidence of various site arrangement of multiple core holes. Our results prove experimentally the feasibility of double-core-hole spectroscopy as a new chemical analysis tool. This work was supported in part by the DOE-SC-BES. [1] L. Fang *et al.*, PRL **105**, 083005 (2010). [2] J. Cryan *et al.*, PRL **105**, 083004 (2010).

Li Fang
Physics Department, Western Michigan University, USA

Date submitted: 04 Feb 2011 Electronic form version 1.4