Final Progress Report for DE-FG03-02ER15285

CONTINUING THE DEVELOPMENT OF A 100 FEMTOSECOND X-RAY DETECTOR

The grant is a one-year renewal for a two-year grant titled “100 femtosecond X-ray Detector” that was awarded to the PI (Zenghu Chang) in 2000 when he was at the University of Michigan. In 2001, the original grant was transferred to Kansas State University with the PI. The detector is an x-ray streak camera running in accumulation mode for time resolved x-ray studies at the existing third generation synchrotron facilities and will also be used for the development and applications of the fourth generation x-ray sources. We have made significant progress on both the detector development and its applications at Synchrotron facilities.

1. PATENTS, PUBLICATIONS AND AWARD

1.1 Patents

- (1). Bing Shan, Chun Wang, Zenghu Chang, “ *Producing 4mJ, 25 fs Pulses from a kHz Laser Using A Single Stage Multipass Amplifier*”, Submitted to US Patent Office, 2003.
- (2) Zenghu Chang, Bing Shan, “*Producing Energetic, Tunable, Coherent X-rays with Long Wavelength Light*”, Submitted to US Patent Office, April, 2001.

1.2 Publications

- (1). S. L. Johnson, P. A. Heimann, A. G. MacPhee, A. M. Lindenberg, O. R. Monteiro, Z. Chang, R. W. Lee, and R. W. Falcone, “*Bonding in liquid carbon studied by time-resolved x-ray absorption spectroscopy*”, submitted to Nature.
- (2). M. F. DeCamp, D. A. Reis, A. Cavalieri, P. H. Bucksbaum, R. Clarke, R. Merlin, E.M. Dufresne, and D. A. Arms, A. Lindenberg and A. Macphee, Z. Chang, J. S. Wark and B. Lings, “*Transient Strain Driven by a Dense Electron-Hole Plasma*,” Phys. Rev. Lett. **91**, 165502 (2003).
- (3). S. L. Johnson, P. A. Heimann, A. M. Lindenberg, H. O. Jeschke, M. E. Garcia, Z. Chang, R.W. Lee, J. J. Rehr, and R. W. Falcone, “*Properties of liquid silicon observed by time-resolved x-ray absorption spectroscopy*”, Phys. Rev. Lett. **91**, 157403 (2003).
- (4). Jinyuan Liu, Jin Wang, Bing Shan, Chun Wang, Zenghu Chang, “*An accumulative x-ray streak camera with sub-600 fs temporal resolution and 50 fs timing jitter*”, Applied Physics Letters **82**, 3553 (2003).