



**19th September 2013 - 2:00 p.m.**  
CFEL-bldg. 99, seminar room I-III

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***SCSS to SACLA: new opportunities for atomic,  
molecular and cluster science with FELs***

Experiments for atoms, molecules and clusters with FELs in Japan are described. At SCSS [1], an intense ( $\sim 10^{14} \text{W/cm}^2$ ), ultrafast ( $\sim 30 \text{ fs}$ ) EUV ( $h\nu \sim 20 \text{ eV}$ ) pulse ionizes any targets multiple times and induces complex electron dynamics unexplored so far [2]. At SACLA [3], deep inner-shell ionization and sequential electronic decay cycles are repeated multiple times in the heavy atom within the XFEL pulse duration ( $\sim 10 \text{ fs}$ ,  $\sim 50 \mu\text{J}/\mu\text{m}^2$  at  $h\nu \sim 5 \text{ keV}$ ) [3], evidencing the necessity to take account of electronic damage in the structure determination by XFEL.

[1] T. Shintake *et al.*, Nat. Photonics, **2**, 555 (2008).

[2] M. Yabashi, H. Tanaka, T. Tanaka, H. Tomizawa, T. Togashi, M. Nagasono, T. Ishikawa, J. R. Harries, Y. Hikosaka, A. Hishikawa, K. Nagaya, N. Saito, E. Shigemasa, K. Yamanouchi, and K. Ueda, J. Phys. B (Topical Reviews) in press.

[3] T. Ishikawa *et al.*, Nature Photon. **6**, 540 (2012).

[4] H. Fukuzawa, S.-K. Son, K. Motomura *et al.*, Phys. Rev. Lett. **110**, 173005 (2103).