

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Homi Bhabha Road, Mumbai-400 005

April 7, 2018

ASET Colloquium

Speaker : **Dr. Asawari Rath (L& PT Division, BARC, Mumbai)**

Title : **Single shot imaging of bio molecules using FELs**

Date & Time : **Friday 13 April 2018 at 16:00 hrs.**

Venue : **Lecture Theater (AG-66.)**

Abstract :

We use a Mach-Zehnder type autocorrelator to split and delay XUV pulses from the FLASH soft X-ray laser for triggering and subsequently probing the explosion of aerosolised sugar balls. FLASH was running at 182 eV photon energy with pulses of 70 fs duration. The delay between the pump-probe pulses was varied between zero and 5 ps, and the pulses were focused to reach peak intensities above 10^{16} W/cm² with an off-axis parabola. The direct pulse triggered the explosion of single aerosolised sucrose nano-particles, while the delayed pulse probed the exploding structure. The ejected ions were measured by ion time of flight spectrometry, and the particle sizes were measured by coherent diffractive imaging. The results show that sucrose particles of 560-1000 nm diameter retain their size for about 500 fs following the first exposure. Significant sample expansion happens between 500 fs and 1 ps. Further, these observations are supported by simulations.

Asawari D Rath et. Al., "Explosion dynamics of sucrose nanospheres monitored by time of flight spectrometry and coherent diffractive imaging at the split-and-delay beam line of the FLASH soft X-ray laser," Opt. Express 22, 28914-28925 (2014)



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