



SEMINAR

Femtosecond protein nanocrystallography at LCLS - toward the molecular movie.

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Tuesday 6 July

11.00am – 12 noon

Science Lecture Theatre S11, Building 25

Abstract

The Linac Coherence Light Source (LCLS) at Stanford is the world's first X-ray laser - we are interested in its applications to biology. It produces about $1E12$ photons of 2-8 kV X-rays in 10 femtosecond pulses, 60 times per second. For the study of difficult-to-crystallize membrane protein nanocrystals we have built an injector device which sprays protein nanocrystals in single-file across the 3-micron LCLS beam, so that one diffraction pattern can be read out from one crystal at 60 Hz, in random orientations. I will discuss the design of the second-generation ASU injector [1] which now includes a pump laser and microscope, so that images of the vaporized nanocrystal (diffraction occurs before destruction of the sample), the liquid jet, and the pump laser can be seen. I will also discuss data analysis for nanocrystals [2] (some just a few unit cells on a side), the new opportunities these experiments offer for phasing, and our June 2010 LCLS experiments using the pump-probe method aimed at imaging the undocking of ferredoxin from Photosystem I nanocrystals made at ASU in Prof P. Fromme's lab. Here millions of snapshot X-ray patterns are recorded for different delays between a visible laser pulse (which initiates the electron transfer to ferredoxin in photosynthesis) and the X-ray pulse. This is a large collaboration involving CFEL/DESY (H. Chapman et al), ASU and ASG MPI Heidelberg (I. Schlichting).

1. DePonte J. Phys D Appl Phys 41, 195505
2. Kirian. Optics Express. 18, 5713 (2010).

Convenor: Associate Professor Joanne Etheridge
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[Printable version of the Clayton campus map \(pdf 833 kb\)](#) (Please right click to open link)