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**KR 2: Plenary Talk - Henry Chapman**

Time: Monday 14:00–14:45

Location: HSZ 01

**Plenary Talk**

KR 2.1 Mon 14:00 HSZ 01

**Diffraction before destruction: Imaging proteins with X-ray free-electron laser pulses** — ●HENRY CHAPMAN — Center for Free-Electron Laser Science, DESY, Hamburg, 22607 Germany — Department of Physics, Hamburg University, 22761 Germany — Center for Ultrafast Imaging, Hamburg, 22761 Germany

The ultrafast pulses from X-ray free-electron lasers have opened up a new method for structure determination of macromolecules. These pulses are of high enough intensity and of sufficiently short duration that individual single-shot diffraction patterns can be obtained from a sample before significant radiation damage occurs. This “diffraction before destruction” method may enable the determination of structures of proteins that cannot be grown into large enough crystals or

are too radiation sensitive for high-resolution crystallography. Ultrafast pump-probe studies of photoinduced dynamics in proteins or other materials can also be studied. We have carried out experiments in coherent diffraction from protein nanocrystals, including membrane bound proteins, at the Linac Coherent Light Source (LCLS) at SLAC. The crystals are delivered to the pulsed X-ray beam in a continuously flowing liquid jet, allowing the collection of millions of diffraction patterns that are merged. The method has begun to yield new structures and has the potential to increase the rate at which structures can be solved. We aim to be able to obtain structures from the smallest possible crystals of only a single unit cell, i.e. single molecules. A dedicated instrument for serial nanocrystallography will be deployed at the European XFEL in Hamburg.