Plenary Talk PV X Thu 9:45 e415

Imaging proteins with X-ray free-electron lasers — •Henry Chapman — CFEL DESY, Hamburg, Germany — Department of Physics, Universität Hamburg, Hamburg, Germany — Center for Ultrafast Imaging, Universität Hamburg, Hamburg, Germany

Free-electron lasers produce X-ray pulses with a peak brightness a billion times that of beams at a modern synchrotron radiation facility. A single focused X-ray FEL pulse completely destroys a small protein crystal placed in the beam, but not before that pulse has passed through the sample and given rise to a diffraction pattern. This principle of diffraction before destruction has given the methodology of serial femtosecond crystallography for the determination of macromolecular structures from tiny crystals without the need for cryogenic cooling. Consequently, it is possible to carry out high-resolution diffraction studies of dynamic protein systems with time resolutions ranging from below 1 ps to milliseconds. Even now, a decade after the first experiment at LCLS, we have not fully explored the limits of the technique, nor developed it to its full potential. I will discuss some of those potentials.