# ICFO COLLOQUIUM HENRY CHAPMAN 'Imaging Macromolecules with X-ray laser pulses'

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October 05, 2018

Friday, October 5, 2018, 12:00. ICFO Auditorium

**HENRY CHAPMAN**

Leader of the Coherent X-Ray Imaging division, Center for Free Electron Laser Science at DESY; Professor of Physics, University of Hamburg, Germany$$

Henry Chapman leads the Coherent X-Ray Imaging division at the Center for Free Electron Laser Science at DESY, and is a professor of physics at the University of Hamburg. His work exploits the tremendous new capabilities of X-ray free-electron lasers, which deliver X-ray pulses that are a billion times more intense than synchrotron radiation, to determine the structure and dynamics of complex materials including macromolecules. He led landmark experiments at FLASH (DESY) and the LCLS (SLAC) that demonstrated the possibility to "outrun" radiation damage with fast pulses and obtain atomic-resolution images from room

temperature protein nanocrystals. His group develops algorithms, instrumentation, and methods for 3D imaging with FEL pulses and collaborates with leading structural biologists around the world.

The short wavelength of X-rays allows us to image structures at the atomic scale, giving detailed pictures of biological macromolecules. However, X-ray radiation is energetic enough to ionize matter: the very act of measurement destroys the structure being investigated. X-ray free-electron lasers provide a new disruptive technology for protein structure determination. The femtosecond pulses outrun radiation damage of the sample, allowing room temperature measurements at high resolution with a dose thousands of times higher than tolerable with synchrotron radiation sources, without having to cool samples to cryogenic temperatures. We have yet to reach the limit of the smallest samples that can be studied this way, and many innovations indicate the feasibility of single molecule diffractive imaging.

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