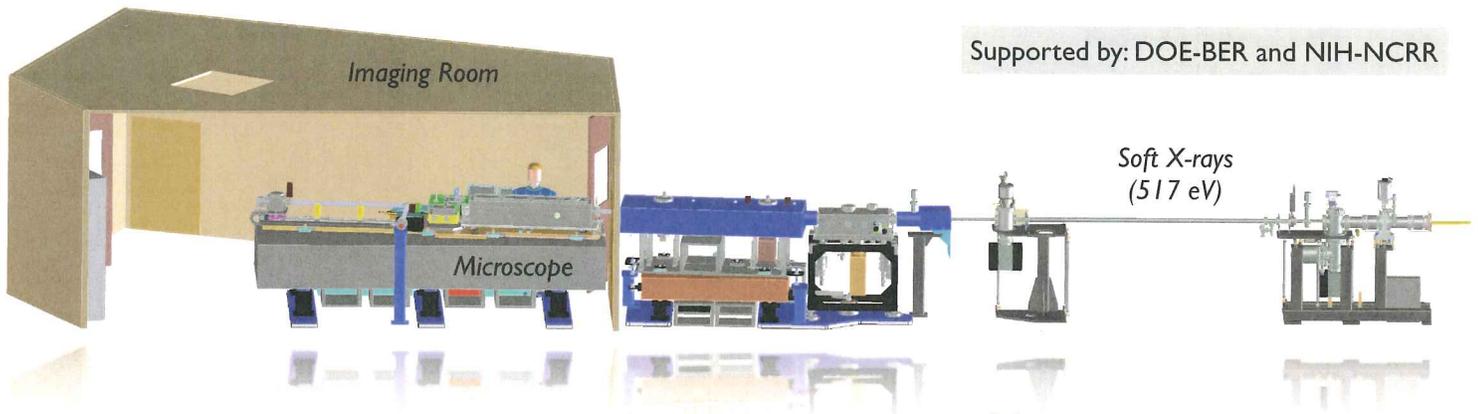


National Center for X-ray Tomography

Lawrence Berkeley National Laboratory & University of California, San Francisco
 Located at the Advanced Light Source, LBNL

Supported by: DOE-BER and NIH-NCRR



- Obtain 3D views of whole cells in their native state at better than 50 nm isotropic resolution
- Natural contrast - image between K shell absorption edges of O₂ (543 eV) & C (284 eV)
- Determine position of molecules with respect to unstained cell structures (organic material absorbs x-rays an order of magnitude more than H₂O)
- Quantitative and fast; 150 msec per field of view

X-ray Tomography

Trends in Cell Biology
 Lymphocyte
 Special Issue: Imaging cell biology
 Cell

Three stages in cell cycle of *S. pombe*

Emiliana huxleyi

Control Triggered

X-ray tomography of algae showing increased lipids (grey) in triggered cell. Green, chloroplast; blue, nucleus; pink, nucleolus. Blake Simmons and Seema Singh, JBEI & D. Parkinson, C. Knoechel, M. Le Gros & C. Larabell, NCXT

Dawsonia superba

Correlated Cryo Fluorescence and X-ray Tomography

| | | | |
|--------------|------------|--------------------------|----------|
| Fluorescence | Orthoslice | Orthoslice & 3D vacuoles | 3D model |
|--------------|------------|--------------------------|----------|

Correlated imaging of *Schizosaccharomyces pombe*. The vacuoles were stained with CMFDA (5-chloromethyl fluorescein diacetate). Bar, 2.0 μ m.

| | | |
|--------------|-------------|-----------|
| Fluorescence | Orthoslices | 3D models |
|--------------|-------------|-----------|

E. coli, from: Le Gros et al (2009) J. Microscopy 235:1-8

National Center for X-ray Tomography

<http://ncxt.lbl.gov>

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Specimen requirements:

Cells, tissues, biofilms $\leq 15 \mu\text{m}$ thick or cryo-sections

Adherent or in suspension

Instruments available in addition to x-ray microscope:

High aperture cryogenic light microscope

Confocal microscope

Live-cell imaging station with environmental chamber

Cell culture facilities

Rapid freezing devices (high-pressure, propane jet, plunge freezer)

Cryo ultramicrotome

Fluorescence activated cell sorter

Reconstruction, analysis and presentation software available:

Mat-Lab - Image processing toolbox

Mat-Lab - Distributed computing toolbox

IMOD

AMIRA

Image-Pro

ImageJ

Chimera

Aspire