Advanced Light Source
(ALS)
LBNL

Stanford Synchrotron
Radiation Laboratory
(SSRL)
SLAC

Four Points of Light

National Synchrotron Light Source
(NSLS)
BNL

Advanced Photon Source
(APS)
ANL

# Four Points of Light

- Imaging
  - Element Specific
  - Scale from 10's of nm to several mm
  - 2-D (maps) and 3-D (tomography)
- X-ray Absorption Spectroscopy
  - Bulk, Micro, Surface
    - Oxidation state, local chemical structure and bonding
  - "Every" element of interest (from Carbon to Actinides)
- Molecular Vibrational States (IR)
- X-ray Scattering/Diffraction
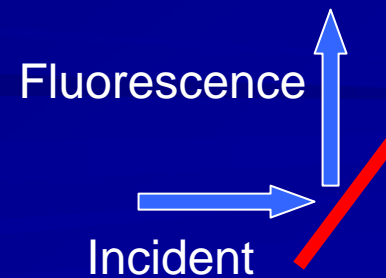 - Bulk, Micro, Surface

X-ray Spectroscopy and Imaging

Transmission

Incident → | → Transmitted

Fluorescence

Fluorescence ↑

Incident →
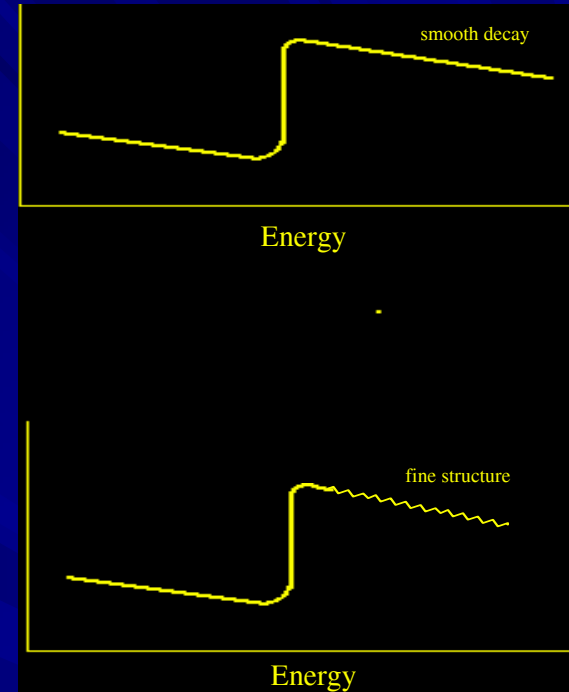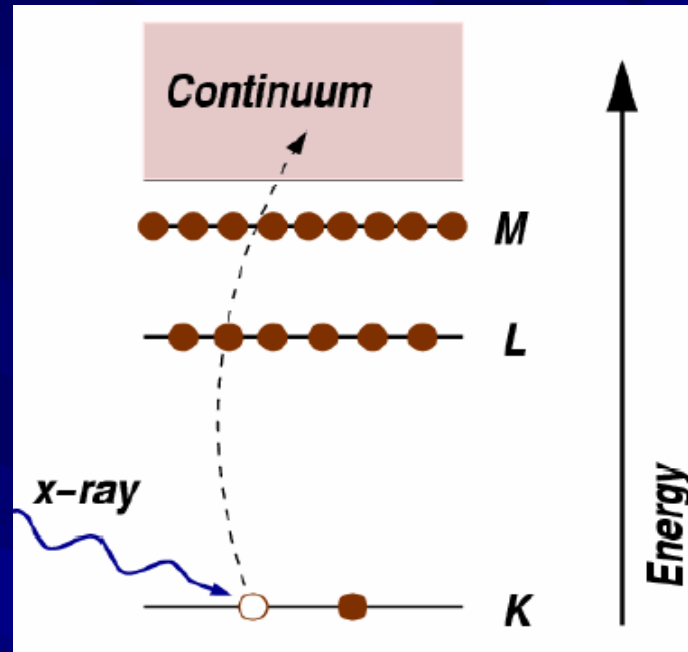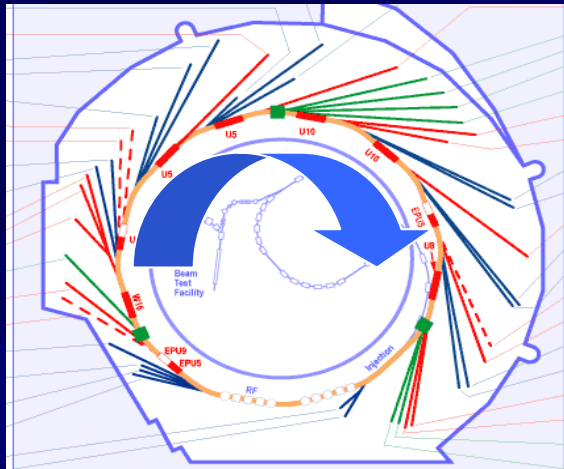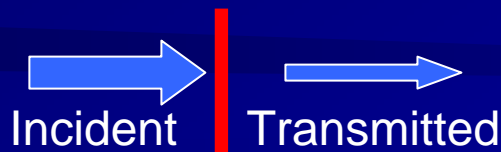
Choices

ALS   SSRL, NSLS   APS

← Soft X-rays   Hard X-rays →

~100 eV/photon
Lighter Elements

~100,000s eV/photon
Heavier Elements

Sample Preparation and Handling

← Simpler   Complex →

Bulk Spectroscopy
(XANES, EXAFS)

Micro-XRF
Micro-spectroscopy
(Hard X-ray)

Soft X-ray Imaging

Data Interpretation

← Simpler   Complex →

Imaging   XANES   EXAFS

Four Points of Contact

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Our Purpose

- **Point of Contact**
  - Referrals to the person who knows
- **Matching Research Questions with Capabilities**
- **Research Collaborations**
  - Planning Experiments
  - Proposal Writing
  - Data Collection, Interpretation, and Integration

How much additional synchrotron need exists in the community and WHY?

1. Is type of data obtainable applicable to my project?
2. How do you actually prepare samples for analysis and get them to the synchrotron intact?
3. How do I get beam time?
4. How do I work out the timing between my experiment and my beam time?
5. How do I make use of the results without becoming a "beam jockey?"