

## **E0040**

**Optics for Inelastic X-ray Scattering and its Biological Applications\***. Esen Ercan Alp, Advanced Photon Source, Argonne National Laboratory, Argonne IL 60439.

Inelastic X-ray scattering techniques with resolution power exceeding  $10^4$ - $10^7$  are being used to study electronic and collective behavior of atoms, molecules, and polymeric chains in condensed materials in some unique ways. In this presentation, we will review several inelastic X-ray scattering techniques that require different optics. These include high energy resolution, momentum-resolved IXS to study phonon dispersion in crystals and liquid amorphous systems, momentum-resolved resonant IXS to study electronic excitations and band structure near Fermi level, X-ray Raman and X-ray emission spectroscopy, and nuclear resonant inelastic X-ray scattering for direct measurement of phonon density of states. Examples will be provided from porphyrin model compounds, hemoglobin and myoglobin, as well as DNA in solutions.

\* Work performed in collaboration with W. Sturhahn, H. Sinn, T. Toellner, J. Zhao, A. Alatas, A. Said, and H. Yavas, all of Argonne National Laboratory, S. H. Chen of MIT, T. Sage of Northeastern University and S. Durbin of Purdue University.

This work is supported by US DOE-BES Materials Science under contract number W-31-109-ENG-38.