01-Instrumentation and Experimental Techniques (X-rays, Neutrons, Electrons)

The largest resonant enhancements have been observed for incident X-rays near the Mo absorption edges of the actinides and near the La absorption edges of the rare earths and transition metals. The polarization and energy dependence of the resonant cross-section has provided a new spectroscopy of magnetic states which is only beginning to be developed in both scattering and absorption geometries. Current experimental work is reviewed and perspectives related to the operation of new, third generation synchrotron radiation sources are discussed.

**MS-01.34.04 MAGNETIC CIRCULAR X-RAY DICHROISM: PROBING LOCAL MAGNETIC STRUCTURES** by Giada Schutz, Experimentalphysik II, Universität Augsburg, Germany, and Siko Stähler, Fakultät Physik, E12, Technische Universität München, Germany

Circular magnetic x-ray dichroism in core-level absorption is the absorptive counterpart of magnetic resonance in scattering. It is based on the same physical phenomenon, the difference of the imaginary part of the charge scattering amplitude for right and left circularly polarized photons in magnetic matter and a complementary element- and symmetry-selective methods to study the magnetic aspects of the electronic structure of solids. Typical magnetic absorption effects at K- and L-edges in the hard and soft x-ray range are presented. Their relation to the spin polarization of unoccupied bands as well as local magnetic spin and orbital moments are discussed in the frame of single-particle band-structure pictures and atomic multiplet theories. Focusing on magnetic multilayered systems as Co/Pt and Co/Cu it is demonstrated that the magnetic circular dichroism measurements yield important new informations on the exchange coupling mechanism especially the role of the local magnetic non-magnetic-interfaces. Also in the EXAFS range, the existence of a magnetic port (SPEXAFS) has been established to be an universal phenomenon, which allows to study local magnetic structures in ferro/magnetic materials. A comparison of the EXAFS allows a clear distinction between magnetic and nonmagnetic neighbor also in case of non-magnetic absorbing atoms. Comparing the peak heights in the SPEXAFS strengths for various magnetic systems a clear correlation between the magnetic contribution to the EXAFS and the spin moment of the neighboring atom is found providing a new possibility of a quantitative investigation of local magnetic short-range order.

**MS-01.34.05 SITE SPECIFIC MAGNETIC XANES.** By H. Kawata, Photon Factory, National Laboratory for High Energy Physics, Tsukuba, Japan.

Magnetic X-ray Absorption Near Edge Structure (XANES) using circularly polarized X-rays gives on the spin-polarized unoccupied electron states (1,2). Recently, the study for ferro- or ferrimagnetic materials by using the experimental method have been rapidly developed. In a case of ferro-magnetic materials, however, there are two different sites for magnetic atoms; for example in the case of Y(Fe(FeO)3) (YIG), the magnetic ions Fe3+ have two different sites. One is an octahedral site and another is a tetrahedral site. The directions of magnetic moment on these sites are opposite to each other. It is naturally expected that the magnetic XANES spectra of Fe K-edge for Fe3+ ion at the octahedral site is different from that for the tetrahedral site, because of the different chemical bonding and the different direction of the magnetic moment. Therefore, it is necessary to analyze the site specific magnetic XANES in order to study these materials. Here we present the first measurement of the site-specific magnetic XANES of YIG by mean of the following two methods.

**PS-01.34.06 MAGNETIC STRUCTURAL STUDIES USING LONG WAVELENGTH PULSED NEUTRONS.** By J. B. Forsyth, C. J. Carlile and P. S. R. Krishna, Rutherford Appleton Laboratory, Chilton, Oxon. OX11 0QX, U.K.

Powder diffractometers at pulsed neutron sources such as ISIS can provide very high resolution scattering data. Neutron scattering, with incident wavelengths of 2Å or longer, is very effective for atomic structural studies. For example, the high resolution Inel 15.5° Bragg仪 is used at ISIS. The low order reflections of interest occur at low 2θ, and are weak due to the paucity of low λ neutrons from the 90 K moderator, normally used. We now report measurements in which the incident beam came from a 25 K liquid H moderator. The enhanced 15.5° flux gives powder patterns having good intensity, excellent...