Spin polarized dichroism and local magnetic moments from resonant photoemission: a band picture

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X-ray spectroscopies are very useful tools to unravel features in the spectra which are often hidden in the corresponding direct processes. Resonant photoemission combines the advantages of core level photoemission and valence band photoemission: it has indeed both elemental selectivity and it probes directly both the outer spin polarized states and their interaction with the deeper states. In resonant photoemission a core electron is excited by photon absorption just above the fermi level, and then partecipates a subsequent autoionization decay. The final state is degenerate with direct valence band photoemission, the amplitudes of the processes generally interfere, and often there is a huge enhancement of the cross section due to the opening of the autoionization path. The understanding of resonant X-ray processes is far from being satisfactory, despite the huge experimental effort, which concerns both the radiative resonant channel and resonant photoemission. From the theoretical point of view, to our knowledge only atomic approaches based on small clusters calculations have been developed for resonant photoemission. There isn't at present a model for solid state which takes into account the delocalization of the electrons and the partecipator channel. We present here a first implementation for resonant photoemission based on the multiple scattering approach in the real space and the first calculations on ferromagnets and antiferromagnets. We also discuss a debate (1,2) about the possibility to measure, using spin polarized resonant photoemission, local magnetic moments in antiferromagnets and disordered magnetic structure.

References

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