Magnetic Surface Resonant X-ray Diffraction

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Bulk magnetic resonant diffraction is known and has been used for many years. It has been applied to study spin and orbital moments in archetypical systems. Using multipolar expansion, it has also allowed the probing of higher order terms such as the toroidal or anapole moment present in specific classes of materials.

On the other side, surface *non-resonant* diffraction is extensively used to probe the structure of surfaces and ultra-thin films. Experiments for surface *resonant* diffraction are not yet very common, but they have already given very interesting results, at electro-chemical interfaces or for ultra-thin metal-oxide films [1]. It is then its sensitivity to the projected density of state of the resonant atoms which is used to get information nearly unreachable by any other techniques. In this context we have recently developed the *ab initio* simulation of this spectroscopy and are able to calculate both the crystal truncation rods and the spectra taken on different points of the truncation rods [2].

We propose now a new extension of our procedure to magnetic systems. This work is prospective because data for magnetic surface resonant diffraction are quite rare and not compared with simulations. Nevertheless, the new capacities at the ESRF must make this techniques reachable.

We go to present in different examples, how the simulations are down and what sensitivity can be expected at the surface of magnetic systems.

References

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