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Report: (cf report on pure Cr, HE-62, and report on $Cr_{85}V_{15}$, HE-276)

The $Cr_{70}V_{30}$ measurements have been the last step of our systematic study of the change of the geometry of the Fermi surface with V concentration. Moreover, the magnetic order of the chromium is linked to the Fermi surface topology.

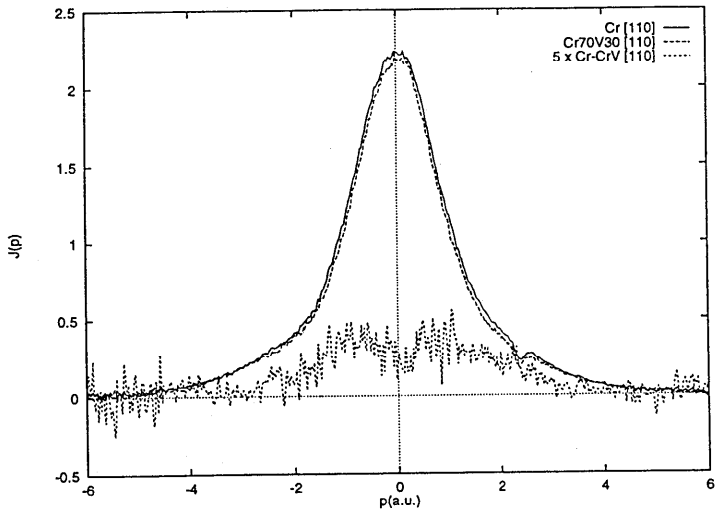
The experiment has been performed with the scattering angle settled at 160° and the synchrotron radiation has been monochromatized at 55.8196 keV. We have measured 7 directional Compton profiles (DCPs) in order to reconstruct the momentum electronic density in the (110) plane. Such a reconstruction allows us to follow the details of the Fermi surface shape when we change concentration of V. In particular, the electronic hole depth at the N point moves with V concentration.

The data sets have been corrected for energy dependent effects such as photoelectric absorption in sample, analyser and air (photon path between sample, analyser and detector).

Due to the flatness of core profile in momentum space, it is easy to subtract its contribution alone from the total measured DCP in order to get the valence DCP of interest.

Experimental valence profiles are normalized to the number of valence electrons of $Cr_{70}V_{30}$.

On figure 1, the Compton profiles of conduction electrons is shown for both Cr and $Cr_{70}V_{30}$ together with their difference for direction [110]:



We follow the same way than for pure Cr (Let us notice that it is the first time, in the case of pure Cr, that the long tails of DCPs have been successfully used for reconstruction of the 2D map) and for $Cr_{85}V_{15}$:

a) at a first step, we make the difference between two directional profiles. Many of the systematic errors cancel when one profile is subtracted from another, in experiment as well as in theory. Such a difference profile gives us the anisotropy of the electronic density for two directions. These anisotropies obtained for Cr, $CR_{85}V_{15}$ and $Cr_{70}V_{30}$ will be compared.

b) the second step is to reconstruct the 2D map of the electronic density in momentum space. Such a reconstruction has been successfully done, as noticed above, for pure Cr [Kai-Ji Chen thesis, Universite Paris 11, Orsay (1997)] and allowed us to find structures which were not seen in positron annihilation experiment. Such a reconstruction is under progress for $Cr_{85}V_{15}$ and will start for $Cr_{70}V_{30}$ when all measured profiles will be analysed.

Moreover, calculations of directional Compton profiles using KKR method (Prof. Nakao, Tokyo) corresponding to the one measured at ESRF are now finished for Cr, and in progress for $Cr_{85}V_{15}$. Such calculations allow us to make comparison between measurements and theory for both difference profiles (anisotropies) and 2D-maps in (110) plane for both Cr and $Cr_{85}V_{15}$. The same work will be done for $Cr_{70}V_{30}$.