ESRF	**Experiment title:** ELECTRONIC STRUCTURE OF TRANSITION METALS (Mn, Fe, Co) IN FERROMAGNETIC OXIDES EXHIBITING THE PEROVSKITE STRUCTURE.	**Experiment number:** HE49
Beamline: ID12B BL26	**Date of experiment:** from: 23/09/96 to: 24/09/96	**Date of report:** 20/02/97
Shifts: 3	**Local contact(s):** J.Goedkoop - N.Brookes	*Received at ESRF:* 27 FEV. 1997

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Report:

The aim of this proposal was to investigate by soft X-rays absorption spectroscopy the electronic structure of perovskite type manganites exhibiting complex magnetic properties such as the recently discovered giant magneto-resistance effects in the manganese compounds. Six shifts were attributed by the hard condensed matter Committee. After the preliminary experiment of November 95, the three last shifts on the DRAGON beam line were dedicated to circular dichroism using the new high magnetic field system (Hmax ≈ 6.5T). With this high magnetic field system, a field reversal could be realized in 10 mn. allowing qualitative XMCD experiments.

Two large and good quality single crystals with nominal composition $La_{0.85}Sr_{0.15}MnO_3$ and $Nd_{0.75}Ba_{0.25}MnO_3$ were available for this experiment. Mn $L_{2,3}$- and 0 K-edges were recorded for the first sample for a few temperatures between 20 to 300K and for a few magnetic fields ranging from 0 to 6.5T.

Nd $M_{4,5}$- and Mn $L_{2,3}$-edges were recorded also on the second sample in the

same conditions of magnetic field and but sample was cooled down to 4K.

The XMCD data for the $La_{0.85}Sr_{0.15}MnO_3$ single crystal are curently treated and the results will be compared to other ones recorded on the same beam line by E.Pellegrin and coworkers on single crystals with higher x values. The $La_{0.85}Sr_{0.15}MnO_3$ compound is characterized by an antiferromagnetic ordering on manganese and an insulator behaviour below 200K.

Some XMCD data for the $Nd_{0.75}Ba_{0.25}MnO_3$ single crystal under high magnetic field (6.5T) and below 130K are shown on figure 1 and 2 at Mn $L_{2,3}$- and Nd $M_{4,5}$-edges respectively.

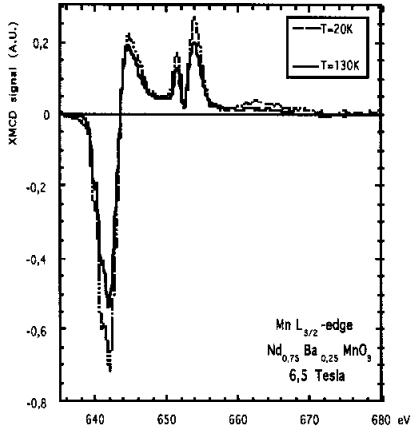

Fig. 1 : XMCD signal at Mn $L_{2,3}$-edge under 6.5T at 130K and 20K.

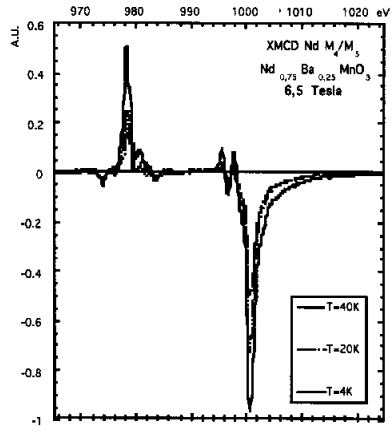

Fig.2: XMCD signal at Nd $M_{4,5}$-edge under 6.5T at 40K, 20K and 4K.

These preliminary results show clearly the antiparallel ordering between neodymium and manganese cations. This is the first time that an antiferromagnetic order is observed in a neodymium manganite even under a high magnetic field since, in the calcium substituted compound $Nd_{0.7}Ca_{0.3}MnO_3$, neutron diffraction studies observed a ferromegnetic order. This antiferromagnetic order between neodymium and manganese has been confirmed recently by neutron diffraction on a polycrystalline sample with the same composition. By extrapolation to the absence of any XMCD signal, a temperature of 70K can be estimated for the ordering of neodymium cations.