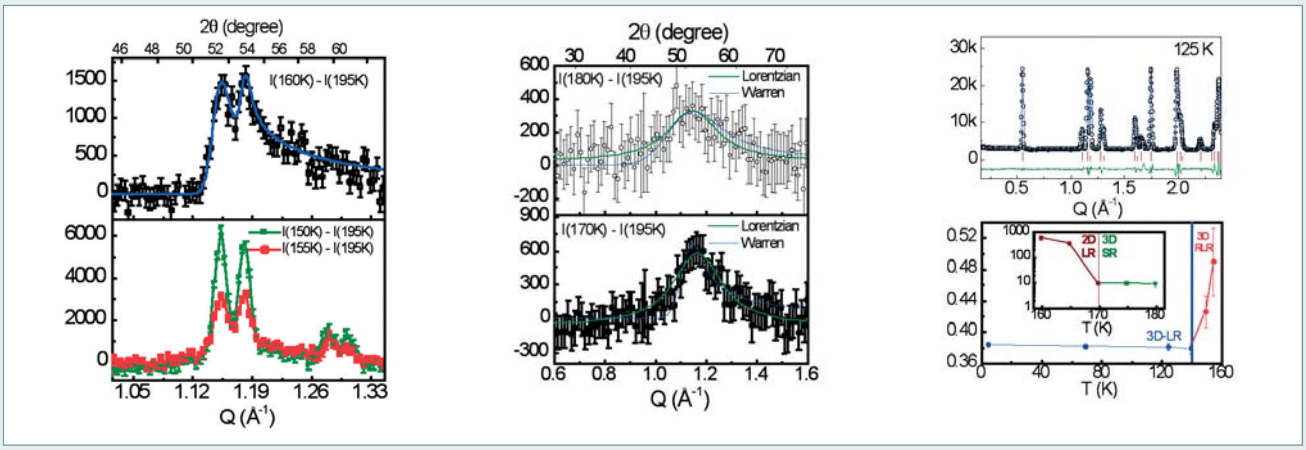
[*C3*. S.M. Yusuf] Two- and three-dimensional magnetic ordering in the bilayer manganite $Ca_{2.5}Sr_{0.5}GaMn_2O_8$

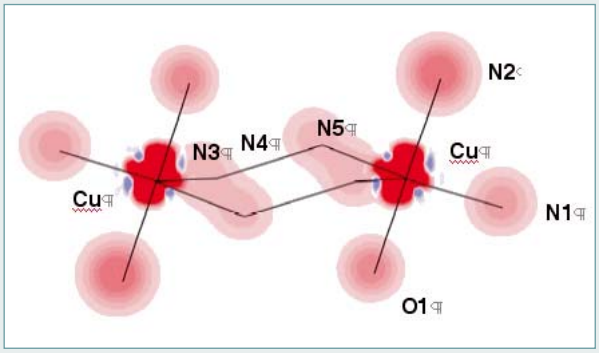
This neutron diffraction study on the bilayered manganite $Ca_{2.5}Sr_{0.5}GaMn_2O_8$ has revealed a crossover phenomenon – from 3D short-range (SR) to 2D long-range (LR), then to restricted 3D LR (RLR), and finally to true 3D LR – in the antiferromagnetic correlations between the [010] oriented Mn spins in the *a-c* plane (Figs. *a-c*). The effect takes place over a wide temperature range. Here 3*d* magnetism and superexchange interactions are involved. The observation of a marked decrease in the resistivity on cooling and of a large negative magnetoresistance (~50 %) near the 3D LR Néel temperature suggest that the electronic and magnetic properties are strongly coupled and dimension-dependent. The present study is therefore highly relevant to the ongoing search for new 2D materials in the field of spintronics.



(a) Magnetic neutron diffraction patterns at 160, 155 and 150 K; nuclear background at 195 K has been subtracted out. The solid curve in the upper panel is a calculated profile using the 2D Warren function; in the bottom panel, lines are guides to the eye. **(b)** Magnetic diffraction patterns at 180 and 170 K ; solid curves are calculated profiles using 2D Warren functions and 3D Lorentzian functions. **(c)** Top: Rietveld-refined neutron diffraction patterns at 125 K; bottom: half width at half maximum (HWHM), averaged for the 3D Bragg peaks (100) and (001). Inset: temperature dependence of the spin-spin correlation length _.
[Collaboration: S.M. Yusuf, M. D. Mukadam, Bhabha Atomic Research Centre, India; J. M. De Teresa, P. A. Algarabel, C. Marquina, and M. R. Ibarra, Universidad de Zaragoza-CSIC, Spain; I. Mirebeau, J.-M. Mignot, LLB]

[*C4*. C. Aronica] Ferromagnetic Interaction in an Asymmetric End-to-End Azido Double-Bridged Copper(II) Dinuclear Complex

The nature of the intramolecular magnetic coupling in azido double-bridged copper(II) dinuclear complexes appears to be highly correlated to the coordination mode of the bridging azido (N3) groups. As a matter of fact, almost all the End-On complexes (›N-N-N bridging mode) present a triplet ground state (S = 1) while the majority of End-to-End complexes (-N-N-N- bridging mode) either display a singlet ground state (S = 0), or behave as two independent spins _. A new End-to-End azido-bridged copper(II) complex $[Cu_2L_2(N_3)_2]$, with L : 1,1,1-trifluoro-7-(dimethylamino)-4-methyl-5-aza-3-hepten-2-onato, has been synthesized and characterized. Despite the rather long Cu–Cu distance (5.105(1)Å) measured from the x-ray diffraction crystal structure determination, the magnetic interaction is ferromagnetic with J = +16 cm-1 ($H = -J\, S_1 S_2$). The experimental spin distribution from polarized neutron diffraction has been found to be localized mainly on the Cu(II) ions. Small delocalization has been observed on the ligand (L) and terminal azido nitrogen atoms, whilst it is strictly zero on the central nitrogen. Such a picture denotes a large contribution of the $d_{x^2-y^2}$ orbital (in the CuN_2N_5 plane) and a small population of the d_{z^2} orbital (along the Cu-N3 direction), in agreement with our calculations.
[C. Aronica, E. Jeanneau, D. Luneau, H. El Moll, G. Pilet, Laboratoire des Multimatériaux et Interfaces, Villeurbanne; M. A. Carvajal, V. Robert, Laboratoire de Chimie, ENS Lyon; B. Gillon, A. Goujon, A. Cousson, LLB]



Experimental induced spin density in $[Cu_2L_2(N_3)_2]$ at 2 K and H = 5 T projected along the b axis. Low levels only are represented: from 0.02 mB/Å² to 0.1 mB/Å² by steps of 0.02 μ_B/Å².