Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Geometrically confined doping in $LaVO_3/SrVO_3$ superlattices U. LUEDERS, A. DAVID, PH. BOULLAY, R. FRÉSARD, W. PRELLIER, P.-E. JANOLIN, CRISMAT TEAM[1], SPMS TEAM[2] — A number of theoretical predictions show that in complex oxides the confinement of t_{2g} electrons to two dimensions can alter strongly the physical properties of these systems compared to their 3D counterpart. To approach experimentally the 2D limit we propose geometrically confined doped superlattices as $LaVO_3/SrVO_3$. Here, a one unit cell thick layer of $SrVO_3$ is introduced between insulating $LaVO_3$ layers to create conducting zones with a 2D character. We synthesized this kind of superlattices by PLD on $SrTiO_3$ (001) substrates. The 2D character of the doped charge carriers influences strongly the physical properties of the superlattices. While the bulk solid solution is an insulating antiferromagnet, in the superlattices, room-temperature magnetism is observed due to the reduction of the bandwidth and a transition from a high temperature weakly localized phase to a low temperature metallic phase is shown to be connected to a structural transition from a metrically tetragonal to monoclinic phase. With the help of theoretical calculations, we will show that these peculiar properties are due to a change of the orbital physics in the vicinity of the $SrVO_3$ doping layers.

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Date submitted: 24 Nov 2010 Electronic form version 1.4