Magnetic specific heat in perovskite oxides: $SrMnO_3$, $EuTiO_3$

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$EuTiO_3$ and $SrMnO_3$ are considered as prototype oxides with strong electron correlations, not well theoretically described so far. A theoretical problem is related with the role played by d or f electrons. In these oxides there are magnetically active ions, Mn and Eu, which have the incomplete $3d/4f$ shell. The Mn^{4+} and Eu^{2+} ions are quite similar in the respect that in the magnetic phase transition practically only the spin degree of freedom are released. Despite of the incomplete $3d/4f$ shell they are insulators. In standard LDA calculations d states in $SrMnO_3$ are obtained on the Fermi level pointing to their itinerant/metallic behavior. In this contribution we would like to compare the magnetic phase transitions in these two systems. We have calculated temperature dependence of the specific heat including the λ-type anomaly and the low-energy atomic-like electronic structure at the sub-meV energy scale. In the magnetic state there exists the discrete electronic structure at the 0.05 meV scale. The good description of c(T) indicates that the realized ionic valency is exactly the same as the formal valency and to a substantial physical adequacy of the crystal-field approach to compounds containing open $3d/4f$ shells where some number of d/f electrons are localized forming atomic-like strongly-correlated electronic systems.