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Unusual interchain coupling effects in frustrated edge-shared chain cuprates with ferromagnetic NN in-chain coupling STEFAN-LUDWIG DRECHSLER, SATOSHI NISHIMOTO, JEROEN VAN DEN BRINK, JIRI MALEK, IFW-Dresden, Institute of Theoretical Solid State Physics, Dresden, Germany, ROMAN KUZIAN, Institute of Material Sciences NASU, Ukraine, Kiev, JOHANNES RICHTER, University of Magdeburg, Germany, MIRIAM SCHMITT, HELGE ROSNER, MPI-CPFS, Dresden, Germany, KUZIAN COLLABORATION, RICHTER COLLABORATION, ROSNER COLLABORATION — We consider the effect of weak antiferromagnetic interchain coupling (AFM IC) on the saturation field, the magnetization curve, the phase diagram of multipolar phases at high magnetic fields, the dynamical magnetic structure factor, as well as the pitch angle at ambient fields applying the DMRG-technique to clusters of coupled long chains and the hard-core boson method to quasi-1D spin nematics at T=0 The critical AFM IC couplings for various multipolar phases and types of IC are determined. The results are applied to Li_2CuO_2, $LiVCuO_4$, $Ca_2Y_2Cu_5O_{10}$, as well as to linarite. The multipolar phases can be stabilized by easy-axis spin anisotropy. Linarite and $LiVCuO_4$, are found to be good candidates for the detection of mulipolar phases. Microscopic considerations based on the extended five-band Hubbard model and L(S)DA+Ucalculations provide exchange integrals which support the empirically found values for the main exchange integrals. We discuss the applicability of spin-wave theory and the role of quantum fluctuations for a correct description of magnetic excitations. Cases when a weak IC coupling dominates solely or predominantly the saturation field and/or the pitch angle are emphasized.

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