Stepwise orderings in anisotropically coupled spin ladders SHUN-SUKE FURUYA, THIERRY GIAMARCHI, Univ of Geneva — In low-dimensional quantum magnets, lowering the temperature, we can find phase transitions from lower to higher dimensional phases. The (unfrustrated) spin ladder is a good example to see such a change of the dimensionality because it occurs only under strong enough magnetic field. That is, the dimensionality in the coupled spin ladder system is controllable by means of the temperature and the magnetic field. In this presentation, we will discuss a cascade of the dimensionality from the 1D phase to the 3D ordered phase via a quasi-2D ordered phase and its interesting manifestation in stepwise temperature dependence of the order parameter. We presume two inequivalent interladder exchange interactions J_1' and J_2'. The former connects spin ladders in a plane to form 2D layers and the latter connects those layers. For $0 < J_2' \ll J_1'$, we would naively expect a very low critical temperature $T_c \to 0$ because quantum fluctuations prevents spontaneous breaking of continuous symmetries. However we would like to point out that it is not the case, that is, T_c remains finite even for infinitesimal J_2', leading to a sudden growth at a certain temperature T_{cr} below T_c.

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