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Phase diagram of the S=1/2 checkerboard antiferromagnet AKIRA FURUSAKI, RIKEN, Japan, LEON BALENTS, University of California, Santa Barbara, OLEG STARYKH, University of Utah — We report the phase diagram of the S=1/2 Heisenberg antiferromagnet on the checkerboard lattice, also known as the crossed-chains lattice. It is assumed that the exchange coupling along the crossing chains, J_2 , is different from that on the inter-chain (square-lattice) links, J_1 . We show that in the one-dimensional limit $J_2 \gg J_1$, the ground state is spontaneously dimerized in the crossed-dimer pattern. At the isotropic planar pyrochlore point $J_2 = J_1$, the ground state is also a valence-bond solid (VBS) but of the plaquette type, as is known from previous studies. We argue that these two VBS states may be connected, as a function of the ratio J_2/J_1 , by an intermediate magnetically-ordered phase. Two quantum critical points, separating the ordered phase from dimerized VBS ones, are analyzed and argued to belong to the O(3) universality class.

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