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Spinon excitation in spatially anisotropic frustrated Heisenberg models MASANORI KOHNO, Department of Physics, UCSB, and Computational Materials Science Center, NIMS, LEON BALENTS, Department of Physics, UCSB, OLEG STARYKH, Department of Physics, University of Utah — We investigate the elementary excitations of spin-1/2 antiferromagnetic Heisenberg models with spatially anisotropic frustrated couplings. By projecting the Hamiltonian into a subspace of exact spinon eigenstates of the one-dimensional chains, we obtain and solve an effective Schrödinger equation. We argue this weak interchain-coupling approach has a broad regime of validity for frustrated models. As a general feature, we find a bound state of spinons and incoherent excitations depending on the momentum. Various experimental features observed in Cs_2CuCl_4 such as asymmetry of the dispersion relation and large tail at $k_x=\pi$[1] are consistently explained within the framework of the present approach with few adjustable parameters. Our results suggest that the spectral features in Cs_2CuCl_4 should be interpreted as descendents of one-dimensional spinons, which persist more strongly at some momenta in spatially anisotropic frustrated systems even with finite interchain couplings.

[1]R. Coldea, D. A. Tennant, and Z. Tylczynski, Phys. Rev. B 68, 134424 (2003).

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