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Phase diagram of Cs_2CuCl_4 in magnetic field LEON BALENTS, HOSHO KATSURA, KITP, UCSB, OLEG STARYKH, University of Utah — The spatially anisotropic spin-1/2 triangular lattice antiferromagnet Cs_2CuCl_4 exhibits a rich variety of phases and a great sensitivity to the direction of applied magnetic field. We argue that this richness is characteristic of the frustrated quasi-one-dimensional geometry, which leads to an exquisite sensitivity to very weak interactions that are usually neglected. For fields perpendicular to the triangular plane, the ground state is predominantly determined by a Dzyaloshinskii-Moriya (DM) interaction which is only 5% of the largest Heisenberg exchange. Surprisingly, most of the phases observed for the in-plane direction of the magnetic field are controlled by even weaker inter-plane interactions, which in turn leads to an enhanced effect of yet still weaker in-plane next-nearest-chain exchange interactions between spins. Additional field-direction-dependent subtleties of the phase diagram are explained by accounting for other weak symmetry-allowed asymmetric DM terms. Globally, the various weak interactions lead to a phase diagram which is dramatically different from that of the simple anisotropic triangular lattice J-J' Heisenberg model.

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