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Cascade of quantum phase transitions in the spin-1/2 triangular-lattice antiferromagnet Cs_2CuBr_4 ¹ NATHANAEL FORTUNE, ADRIENNE WILSON-MUENCHOW, Smith College, SCOTT HANNAHS, National High Magnetic Field Laboratory, YASU TAKANO, University of Florida, YASUO YOSHIDA, University of Hamburg, TODD SHERLINE, Oak Ridge National Laboratory, TOSHIO ONO, HIDEKAZU TANAKA, Tokyo Institute of Technology — In classical magnetic spin systems, geometric frustration leads to a large number of states of identical energy. We report here calorimetric and magnetocaloric evidence that in Cs_2CuBr_4 — a geometrically frustrated Heisenberg $S=1/2$ triangular antiferromagnet — quantum fluctuations stabilize a series of gapped collinear spin states bounded by first-order transitions at simple increasing fractions of the saturation magnetization for fields directed along the c axis. Only the first of these quantum phase transitions has been theoretically predicted. We discuss how the higher fraction quantum states might arise and propose model spin arrangements. The Dzyaloshinskii-Moriya interaction breaks the symmetry when the magnetic field is directed along the triangular layers, providing one possible explanation for the directional dependence and the 1st order nature of the transitions.

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