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Non-monotonic magnetic field dependence of the staggered-moment in two-dimensional frustrated antiferromagnets MOHAMMAD SIAHATGAR, BURKHARD SCHMIDT, PETER THALMEIER, Max Planck Institute for Chemical Physics of Solids — We present an efficient method to identify the degree of frustration in quasi-two-dimensional (2D) antiferromagnets described by the J_1-J_2 quantum Heisenberg model. The frustration ratio J_2/J_1 is commonly obtained from the analysis of magnetic susceptibility, specific heat, and saturation field. We show that the field-induced suppression of quantum fluctuations causes a nonlinear and non-monotonic magnetic field dependence of the staggered moment which depends strongly on the frustration ratio. This serves as a powerful criterion to determine J_2/J_1 using a combination of the exact diagonalization method on finite clusters and the spin-wave analysis. We apply this method to the quasi-2D compound $Cu(pz)_2(ClO_4)_2$ obtaining an intermediate ratio of $J_2/J_1 \simeq 0.2$ for the frustration.

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