First-order phase transition in a gauge theory of $S = 1/2$ quantum antiferromagnets in the deep easy-plane limit\footnote{Work supported by the Norwegian Research Council.} ASLE SUDBO, STEINAR KRAGSET, EIVIND SMORGRAV, JOAKIM HOVE, Norwegian University of Science and Technology, FLAVIO NOGUEIRA, Freie Universitaet Berlin. — We perform large-scale Monte Carlo simulations on an effective gauge theory for a deep easy-plane antiferromagnet, including a Berry phase term that projects out the $S = 1/2$ sector. Without a Berry phase term, the model exhibits a phase transition in the $3DXY$ universality class associated with proliferation of gauge-charge neutral $U(1)$ vortices. The instantons that eliminate the phase transition in the gauge-charged sector are suppressed by the Berry phases. The result is a first-order phase transition.