**Semi-classical Approach to Quantum Spin Ice** CLAUDIO CASTEL-
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France, MICHAL P. KWASIGROCH, T.C.M. Group, Cavendish Laboratory, Uni-
versity of Cambridge, J. J. Thomson Avenue, Cambridge CB3 0HE, U.K. — We
propose a semi-classical description of the low-energy properties of quantum spin
ice in the strong Ising limit. Within the framework of a semiclassical, perturbative
Villain expansion, that can be truncated at arbitrary order, we give an analytic
and quantitative treatment of the deconfining phase. We find that photon-photon
interactions significantly renormalise the speed of light and split the two transverse
photon polarisations at intermediate wavevectors. We calculate the photon velocity
and the ground state energy to first and second order in perturbation theory, respec-
tively. Both are in good agreement with recent numerical simulations. We further
compute the classical energy of the vison excitation.

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