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Theory of spin liquids in integer spin pyrochlores SUNGBIN LEE, University of California, Santa Barbara, SHIGEKI ONODA, Condensed Matter Theory Laboratory, RIKEN, LEON BALENTS, Kavli Institute for Theoretical Physics, University of California, Santa Barbara — Rare earth pyrochlores, with a chemical formula $A_2B_2O_7$, exhibit many interesting features in A site spin system. Depending on A site rare earth elements, spin ice and magnetically ordered phases are shown in several experiments. Moreover, they have been also focused as possible candidates of U(1) spin liquid. In order to explore such versatile phases, we study the pseudospin-1/2 model, which is quite generic to describe rare earth pyrochlores with integer spins, in the presence of spin-orbit coupling and crystalline electric field. Using a new “gauge mean field theory,” we show the possible ground states, corresponding to several phases listed above. We also briefly discuss the experimental suggestions based on our theory.

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