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**Quantum Fluctuations in Spin-Ice-Like $Pr_2Zr_2O_7$**[1] JIAJIA WEN, IQM, JHU, KENTA KIMURA, SATORU NAKATSUJI, ISSP, University of Tokyo, COLLIN BROHOLM, IQM, JHU; NCNR, NIST; Neutron Science Directorate, ORNL, MATTHEW STONE, Neutron Science Directorate, ORNL, EIJI NISHIBORI, HIROSHI SAWA, Dept of Applied Physics, Nagoya University — We report the experimental evidence of spin-ice-like correlation and quantum fluctuation in the rare earth pyrochlore $Pr_2Zr_2O_7$. Low temperature magnetization together with high energy inelastic neutron scattering spectrum reveal the single ion crystal field ground state of $Pr^{3+}$ is a non-Krammer's doublet with local <111> anisotropy. Heat capacity and magnetic susceptibility data show no evidence of long range ordering down to 50 mk. The magnetic interaction energy scale is estimated from AC magnetic susceptibility data where an activation energy gap of 1.6 K is extracted from T-dependent relaxation time. The wave vector dependence of quasi-elastic neutron scattering at 0.1 K resembles that of exchange spin ice, including well-defined pinch points. This indicates the 2-in 2-out ice rule is satisfied over the time scale set by the instrumental energy resolution. In contrast, inelastic scattering with energy transfer of 0.25 meV does not show pinch pints, which suggests these fluctuations break the ice rule. The spectral weight of the elastic scattering accounts for less than 10% of the total scattering from the ground state doublet, providing evidence for the strong quantum fluctuation.

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