

Abstract Submitted  
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**Possible observation of photon excitations in the quantum spin-ice  $\text{Pr}_2\text{Zr}_2\text{O}_7$**  YOSHIFUMI TOKIWA, TAKUYA YAMASHITA, DAIKI TERAZAWA, TAKAHITO TERASHIMA, Kyoto University, KENTA KIMURA, Osaka University, MARIO HALIM, SATORU NAKATSUJI, University of Tokyo, YUJI MATSUDA, Kyoto University — It has been theoretically shown that the ground state of spin-ice system with quantum fluctuations can be quantum spin liquid, where new elementary excitations, photon, emerge [1]. In the rare-earth pyrochlore,  $\text{Pr}_2\text{Zr}_2\text{O}_7$ , which contains spin-ice correlations with significant quantum fluctuations, the absence of magnetic ordering even at very low temperature suggests formation of quantum spin liquid state [2]. In order to examine the emergence of new exotic excitations, we have performed low-temperature thermal conductivity ( $\kappa$ ) measurements of  $\text{Pr}_2\text{Zr}_2\text{O}_7$ . Interestingly, our data of  $\kappa/T$  shows a steep increase with decreasing temperature below 0.2K. Since the monopole density is negligibly small at such low temperature, the steep increase possibly indicates emergence of new elementary excitations. Anomalous magnetic-field dependence of  $\kappa/T$  observed below 0.2K further supports this possibility. [1] M. Hermele et al., Phys. Rev. B 69, 064404 (2004). [2] K. Kimura et al., Nature Commun. 4, 1934 (2013).

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