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Anderson-Higgs transition in quantum spin ice $Yb_2Ti_2O_7$ L.J. CHANG, Department of Physics, National Cheng Kung University, Tainan 70101, Taiwan, S. ONODA, Condensed Matter Theory Laboratory, RIKEN, Wako, Saitama 351-0198, Japan, Y. SU, Juelich Centre for Neutron Science JCNS-FRM II, Forschungszentrum Juelich GmbH, Outstation at FRM-II, Lichtenbergstrasse 1, D-85747 Garching, Germany, Y.-J. KAO, Department of Physics, and Center of Quantum Science and Engineering, National Taiwan University, Taipei 10607, Taiwan, K.D. TSUEI, National Synchrotron Radiation Research Center, HsinChu 30076, Taiwan, Y. YASUI, Department of Physics, Division of Material Science, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8602, Japan, K. KAKURAI, Quantum Beam Science Directorate, Japan Atomic Energy Agency, Tokai, Ibaraki 319-1195, Japan, M.R. LEES, Department of Physics, University of Warwick, Coventry CV4 7AL, United Kingdom — We have carried out polarized elastic neutron-scattering experiments on single crystals $Yb_2Ti_2O_7$ from 1 K to 0.04 K. The results reveal that the diffuse [111]-rod scattering [1] is suppressed below $T_c \sim 0.21$ K, where magnetic Bragg peaks and a full depolarization of neutron spins are observed with the thermal hysteresis, indicating a first-order ferromagnetic transition. Theoretically, a quantum spin ice state [2] above T_c has been realized from an effective classical model where <111> Ising moments, i.e., pseudospin-1/2 interact mainly through a magnetic dipolar interaction [3], and a transition from magnetic Coulomb phase to Higgs phase has emerged at T_c in $Yb_2Ti_2O_7$.
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L. J. Chang
Dept of Physics, National Cheng Kung University,
Tainan 70101, Taiwan

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