Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Dicke Model for Quantum Hall Systems YUSUKE HAMA, RIKEN, MOHAMMAD FAUZI, Tohoku University, KAE NEMOTO, National Institute of Informatics, YOSHIRO HIRAYAMA, Tohoku University, ZYUN EZAWA, RIKEN — Quantum Hall (QH) systems comprise of many-body electron spins and nuclear spins. They are weakly coupled with nuclear spins through the hyperfine interaction so that electron spin dynamics is scarcely affected by the nuclear spins. The dynamics of the QH systems, however, may drastically change when the nuclear spins interact with low energy collective excitation modes of the electron spins. In connection with this, the nuclear spin relaxation measurement have revealed novel behaviors in the canted antiferromagnetic phase in the total filling factor two bilayer QH systems [1,2]. Here, we theoretically study the interaction between the nuclear spins and the linear dispersing Nambu-Goldstone mode mediated by the hyperfine interaction. We show that such interaction is effectively represented by the Dicke model, and predict that collective spin phenomena realized in quantum optical systems are also observed in the QH systems [3]. References: [1] N. Kumada et al., Science 313, 329 (2006). [2] M. H. Fauzi et al., Phys. Rev. B 90, 235308 (2014). [3] Y. Hama et al., arXiv:1510.04792v1.

Yusuke Hama
RIKEN

Date submitted: 05 Nov 2015 Electronic form version 1.4