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Spin Polarization of Bilayer ν=2 Quantum Hall States Probed by NMR NORIO KUMADA, KOJI MURAKI, NTT Basic Research Laboratories, YOSHIRO HIRAYAMA, Tohoku University, SORST-JST, NTT Basic Research Laboratories — In a bilayer system at total Landau level filling factor ν=2, the interplay between intralayer and interlayer interactions leads to quantum Hall (QH) states with various spin configurations: the ferromagnetic (F), canted antiferromagnetic (CAF) and spin-singlet (SS) states. Recently, by measuring the nuclear spin relaxation rate $1/T_1$, which probes the in-plane spin fluctuations, we have demonstrated the existence of the Goldstone mode predicted for the CAF state [1]. In this study, we report the direct measurement of the spin polarizations of these states by using a current pump and resistively detected NMR technique. The double-quantum-well sample used has a tunneling energy gap of 8 K. Since electron spins add effective Zeeman field to nuclear spins, the electron spin polarization appears as a shift in the nuclear resonant frequency, i.e., the Knight shift. As the bias potential between the two layers is increased, the spin polarization changes from full to zero continuously, indicating the phase transitions from the F to SS states via the CAF state. The combination of the data for the Knight shift and $1/T_1$ allows for more complete understanding of the spin ordering including both in-plane and out-of-plane components and fluctuations in these states. [1] N. Kumada, K. Muraki and Y. Hirayama, Science 313, 329 (2006).

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