Abstract Submitted
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Pseudospin Vortex-Antivortex States with Interwoven Spin Texture in Double Layer Quantum Hall Systems[1] B. ROOSTAEI, U. of Oklahoma, J. BOURASSA, U. of Sherbrooke, H. FERTIG, U. of Indiana, K. MULLEN, U. of Oklahoma, R. COTE, U. of Sherbrooke — Enhanced nuclear spin relaxation rates have been observed in recent experiments[1] on double layer quantum Hall systems near total filling factor $\nu_T = 1$. The effect is analogous to what happens in single layer systems, where a possible explanation lies in the development of a Skyrme crystal with low energy spin wave modes as the system is doped away from integer filling. Double layer systems are thought to support bimeron excitations, analogous to skyrmions but with layer indices playing the role of spin states. We demonstrate,within the Hartree-Fock approximation, that for low interlayer tunneling and large separations the bimerons reorganize into a vortex-antivortex lattice with an interwoven real spin texture. These states are most stable at large layer separation, where the introduction of the spin degree of freedom can relax an interlayer charge imbalance at the cores of the merons. The presence of the real spin texture produces a true spontaneously broken symmetry whose Goldstone modes can explain the enhancement of the nuclear spin relaxation. [1]I.B. Spielman et al., Phys. Rev. Lett. 94, 076803 (2005).

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