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Phase diagram of $\nu = 1/2+1/2$ quantum Hall bilayers ZHENG ZHU, Department of Physics, Massachusetts Institute of Technology, D.N. SHENG, Department of Physics and Astronomy, California State University, Northridge, LIANG FU, Department of Physics, Massachusetts Institute of Technology — We study $\nu = 1/2 + 1/2$ quantum Hall bilayer systems with different layer distance d by exact diagonalization method. The energy spectrum under periodical and twisted boundary conditions shows the gap opening in spin sector near $d/l_B = 1.6$. For the smaller layer distance, we find the the change of low-lying excitations induced by energy level crossing near $d/l_B = 1.1$, the goldstone mode or pseudo-spin wave excitation is no longer the lowest excitation. Besides, the drag Hall conductance is finite and non-quantized. For the larger layer distance, we find the intermediate phase with four-fold degeneracy and zero drag Hall conductance, which has distinguished energy spectrum compared with the decoupled CF Fermi liquid states. The transition for different phases has also been discussed.

Zheng Zhu
Department of Physics, Massachusetts Institute of Technology

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