

Abstract Submitted
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Quantum Hall Phase Diagram of Second and Lowest Landau-level Half-filled Bilayers: Abelian versus Non-Abelian States¹ MICHAEL PETERSON, SANKAR DAS SARMA, Condensed Matter Theory Center, University of Maryland — The fractional quantum Hall phase diagram of the half-filled bilayer system in the two lowest Landau levels (lowest and second) is studied as a function of tunneling and layer separation using exact diagonalization. We make the striking prediction that second Landau level bilayer structures at filling factor $5/2$ would manifest two distinct branches of incompressible fractional quantum Hall effect (FQHE) corresponding to the Abelian 331 state (at moderate to low tunneling and large layer separation) and the non-Abelian Pfaffian state (at large tunneling and small layer separation). The observation of these two FQHE branches at $5/2$ and the quantum phase transition between them would be compelling evidence supporting the existence of the non-Abelian Pfaffian state in the second Landau level. In the lowest Landau level at filling factor $1/2$, we find that, although possible in principle, it is unlikely that the non-Abelian Pfaffian FQHE exists.

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