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Phase Diagram of Fractional Quantum Hall Effect of Composite Fermions in Multi-Component Systems[1] AJIT COIMBATORE BALRAM, Pennsylvania State University, CSABA TŐKE, Budapest University of Technology and Economics, ARKADIUSZ WÓJS, Wroclaw University of Technology, JAINENDRA JAIN, Pennsylvania State University — The fractional quantum Hall effect (FQHE) of composite fermions (CFs) produces delicate states arising from a weak residual interaction between CFs. We study the spin phase diagram of these states, motivated by the recent experimental observation by Liu et al. [1] of several spin-polarization transitions at 4/5, 5/7, 6/5, 9/7, 7/9, 8/11 and 10/13 in GaAs systems. We show [2] that the FQHE of CFs is much more prevalent in multicomponent systems, and consider the feasibility of such states for systems with N components for an SU(N) symmetric interaction. Our results apply to GaAs quantum wells, wherein electrons have two components, to AlAs quantum wells and graphene, wherein electrons have four components (two spins and two valleys), and to an H-terminated Si(111) surface, which can have six components. We provide a fairly comprehensive list of possible incompressible FQH states of CFs, their SU(N) spin content, their energies, and their phase diagram as a function of the generalized "Zeeman" energy. The results are in good agreement with available experiments.
[1] Yang Liu, D. Kamburov, S. Hasdemir, M. Shayegan, L.N. Pfeifer, K.W. West, K.W. Baldwin, arXiv:1407.7846
[2] Ajit C. Balram, Csaba Tőke, A. Wójs, J. K. Jain, arXiv:1410.7447

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