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Effects of alloy disorder on the non-Abelian fractional quantum Hall states HONGXI LI, ETHAN KLEINBAUM, NIANPEI DENG, GEOFF GARDNER, MICHAEL MANFRA, GABOR CSATHY, Purdue University — The presence of disorder suppresses various ordered states. However, we still lack quantitative knowledge of the effects of disorder on various parameters. Here we examine the reduction of the energy gap of the $\nu = 5/2$ and $\nu = 7/2$ fractional quantum Hall states by alloy disorder introduced to GaAs/AlGaAs samples during the MBE growth process. We determined the energy gap and disorder broadening of the even denominator fractional quantum Hall states using the model proposed by Morf and d’Ambrumenil. This quantitative analysis gives nonphysical dependence of disorder broadening parameter on alloy disorder concentration. However, using a modified analysis relying on shared intrinsic gaps will yield linear relationship between these two parameters. Furthermore, this method also enables us to distinguish effects of the short-range alloy disorder and that of other long range scattering disorders. This work was supported by No. DE-SC0006671.

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