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Spontaneous Symmetry Breaking in the U(2) Planar Thirring Model?

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Whether the $U(2N)$ symmetry of Dirac fermions in 2+1 space-time dimensions is spontaneously broken by pair condensation once interactions are present is an important problem in non-perturbative quantum field theory. Here I focus on the Thirring model, whose interaction is a current-current contact term, using numerical simulations of a lattice model formulated with domain wall fermions - it has been demonstrated that $U(2N)$ symmetry is recovered in the limit of infinite wall separation. I present results obtained with flavor numbers $N=0, 1$ and 2 , and will attempt to put both upper and lower bounds on N_c , the critical number of flavors above which symmetry breaking does not occur even for arbitrarily strong coupling. The resulting N_c will be shown to be very far from the value $N_c \approx 6.6$ obtained with staggered lattice fermions, which not observe $U(2N)$ symmetry.

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