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Constraints on the Dirac spectrum from chiral symmetry restoration and the fate of $U(1)_A$ symmetry

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I discuss chiral symmetry restoration in the chiral limit of QCD with two quark flavours of mass m , focussing on its consequences for scalar and pseudoscalar susceptibilities, and on the resulting constraints on the Dirac spectrum. I show that $U(1)_A$ symmetry remains broken in the $SU(2)_A$ symmetric phase if the spectral density $\rho(\lambda; m)$ develops a singular near-zero peak, tending to m^4/λ in the chiral limit. Moreover, $SU(2)_A$ restoration requires that the number of modes in the peak be proportional to the topological susceptibility, indicating that such a peak must be of topological origin.

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