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Spin liquid aspects of the two dimensional Heisenberg antiferromagnet

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Since it was established that the 2D quantum (S=1/2) Heisenberg antiferromagnet on a square lattice develop long range order at T=0, albeit with only 60% of the classical moment, it was believed that the excitaitons of this model should be classical spin waves only weakly renormalised by quantum fluctuations. Through neutron scattering investigations of CFTD, an excellend physicsl realisation of the model system, we have recently discovered i) a moderate deviation from the spin wave prediction for the zone boundary energies and ii) a huge, 50%, deviation in intensity at Q=(pi,0). We interpret this as signature of valence bond type correlations in the quantum fluctuating part of the ground state. Although the valence bond state lacks long range order, which must be introduced through a variational approach, our results suggest that it may actually be a better starting point for approaches to understand spin fluctuations upon hole-doping as in the high temperature superconducting cuprates.