

The *exact* result (for the exponential) at finite N is

$$\xi = \Lambda^{-1} \exp \left(\frac{2\pi\rho_s}{(N-2)T} \right)$$

Neutron scattering measures the structure factor, and the peak value is $S(0)$

$$S(0) = \frac{NT}{\rho_s} \xi^2 = \frac{NT}{\Lambda^2 \rho_s} \exp \left(\frac{4\pi\rho_s}{(N-2)T} \right)$$

So there is no Bragg peak at the ordering wavevector for any two-dimensional antiferromagnet.

La_2CuO_4 has a non-zero ordering temperature $T_N = 325\text{K}$, and this arises solely from the *inter-layer* coupling.