

Abstract Submitted  
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**Diverging Length Scale, Scaling, and Universality of Entanglement Near a Quantum Phase Transition** HAN-DONG CHEN, UIUC — In this work, we show that an important quantity to study about entanglement near a quantum phase transition is the two-body entanglement  $S(i,j)$ , which measures the entanglement between two separated degrees of freedom  $(ij)$  and the rest of system. We establish its relation to correlation functions in the long range limit. Away from the critical point,  $S(n)$  saturates with a characteristic length scale  $\xi_E$ , as the distance  $n$  increases. The entanglement length  $\xi_E$  diverges near the critical point with the same critical exponent as correlation length. At the critical point,  $S(n)$  follows a power law. The universality and finite size scaling of entanglement are demonstrated in a class of exactly solvable spin model.

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