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Probing quantum phase transitions on a spin chain with a double quantum dot[1] YUN-PIL SHIM, University of Wisconsin-Madison, SANGCHUL OH, University at Buffalo, State University of New York, JIANJIA FEI, University of Wisconsin-Madison, XUEDONG HU, University at Buffalo, State University of New York, MARK FRIESEN, University of Wisconsin-Madison — We propose a local, projective scheme for detecting quantum phase transitions (QPTs) in a quantum dot spin chain [1]. QPTs in qubit systems are known to produce singularities in the entanglement, which could in turn be used to probe the QPT. Current proposals to measure the entanglement are challenging however, because of their nonlocal nature. We present numerical and analytical evidence that entanglement in a double quantum dot (DQD) coupled locally to a spin chain exhibits singularities at the critical points of the spin chain, and that these singularities are reflected in the singlet probabilities of the DQD. This result suggests that a DQD can be used as an efficient probe of QPTs through projective singlet measurements. We propose a simple experiment to test this concept in a linear triple quantum dot. [1]Y.-P. Shim *et al.*, arXiv:1209.5445

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