Abstract Submitted
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**Bound state of two spinons in a S=1/2 Heisenberg antiferromagnet on kagome**[1] ZHIHAO HAO, OLEG TCHERNYSHYOV, Johns Hopkins University — Elser et al. [1,2] identified a promising route to the ground state of the S=1/2 Heisenberg antiferromagnet on kagome via dimerized states, in which 3/4 triangles contain a valence bond. Quantum dynamics arises from the remaing "defect" triangles lacking a valence bond. We study an isolated defect on the Husimi cactus, a tree-like modification of kagome [1,3]. We show that the defect can be viewed as a bound state of two fermionic spinons with S=0. The bound state is small, on the order of 1.5 lattice spacings. It is localized and has a binding energy of 0.06 J relative to the 2-spinon continuum. No bound state is formed by 2 spinons with S=1. We argue that the pair-binding energy determines the spin gap of the kagome antiferromagnet. Our result for the gap agrees with the existing numerics [4,5]. [1] V. Elser and C. Zeng, Phys. Rev. B 48, 13647 (1993). [2] C. Zeng and V. Elser, Phys. Rev. B 51, 8318 (1995). [3] P. Chandra and B. Doucot, J. Phys. A: Math. Gen. 27, 1541 (1994). [4] Ch. Waldtmann et al., Eur. Phys. J. B 2, 510 (1998). [5] R. R. P. Singh and D. A. Huse, arXiv:0801.2735.

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