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Possible critical behavior driven by the confining potential in optical lattices with ultra-cold fermions CHRIS HOOLEY, University of St Andrews, U.K., VIVALDO CAMPO JR, Universidade Federal de Sao Carlos, Brazil, JORGE QUINTANILLA, STFC Rutherford Appleton Laboratory, U.K. — A recent paper [V.L. Campo *et al.*, *Phys. Rev. Lett.* **99**, 240403 (2007)] has proposed a two-parameter scaling method to determine the phase diagram of the fermionic Hubbard model from optical lattice experiments. Motivated by this proposal, we investigate in more detail the behavior of the ground-state energy per site as a function of trap size (L) and confining potential ($V(x) = t|x/L|^\alpha$) in the one-dimensional case. Using the BALDA-DFT method, we find signatures of critical behavior as $\alpha \rightarrow \infty$.

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