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**Approach toward Linear Scaling QMC**<sup>1</sup> BRYAN CLARK,  
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ence Department at UIUC — Quantum Monte Carlo simulations of  
fermions are currently done for relatively small system sizes, e.g., fewer  
than one thousand fermions. The most time-consuming part of the code  
for larger systems depends critically on the speed with which the ra-  
tio of a wavefunction for two different configurations can be evaluated.  
Most of the time goes into calculating the ratio of two determinants; this  
scales naively as  $O(n^3)$  operations. Work by Williamson, et al. (2) have  
improved the procedure for evaluating the elements of the Slater matrix,  
so it can be done in linear time. Our work involves developing methods  
to evaluate the ratio of these Slater determinants quickly. We compare a  
number of methods including work involving iterative techniques, sparse  
approximate inverses, and faster matrix updating.

(2) A. J. Williamson, R.Q. Hood and J.C. Grossman, Phys. Rev. Lett.  
87, 246406 (2001)

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Prefer Oral Session  
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