

Abstract Submitted
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Interacting boson problems can be QMA-hard TZU-CHIEH WEI,
University of British Columbia, MICHELE MOSCA, ASHWIN NAYAK, Univer-
sity of Waterloo and Perimeter Institute for Theoretical Physics — Computing the
ground-state energy of interacting electron (fermion) problems has recently been
shown to be hard for QMA, a quantum analogue of the complexity class NP.
Fermionic problems are usually hard, a phenomenon widely attributed to the so-
called sign problem occurring in Quantum Monte Carlo simulations. The corre-
sponding bosonic problems are, according to conventional wisdom, tractable. Here,
we discuss the complexity of interacting boson problems and show that they can
also be QMA-hard. In addition, we show that the bosonic version of the so-called
N-representability problem is QMA-complete, as hard as its fermionic version. As a
consequence, these problems are unlikely to have efficient quantum algorithms.

Tzu-Chieh Wei
University of British Columbia

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