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Minimal energy gap of adiabatic quantum computing of multi-state extended Simon's problem

A method to realize the oracle for Simon's problem by quantum adiabatic computation, which is discussed by Hen [1] is extended to the models with p states. With the model, how the minimal energy-gap is dependent on p is discussed. As the further extension of the p -dependence, the minimal energy-gap of the oracle of Shor's algorithm of factorization is discussed.

[1] I. Hen, Europhysics Letters 105, 50005 (2014), arXiv:1307.6538.