Dear Royal Society Publishing Group,

Thank you for sending the PDF proof of RSTA20110360. Here are the answers to the queries.

Q1: Please provide page number for quotes.

A1: The page number is 468.

Q2: Please check the sense of the sentence ‘Undoubtedly, ...complicated’.

A2: To avoid confusion, this sentence could be changed to ‘With the qubits needed growing with the size of the target molecule, the method of preparing qubits to the ground-state \phi of the molecular Hamiltonian will become more complicated’

Q3: Should the phrase ‘originally exponentially cost problem’ be changed to ‘originally exponential cost problem’. Please check.

A3: Yes, it is suitable.

Q4: Please check the sense of the sentence ‘In this model, ...’.

A4: This sentence can be changed to ‘In this model, we used the method called ‘hydrogen-subway’ with low intensities of laser to avoid Keldysh limit [43], which is a potential problem in conventional above barrier pump–dump approach involving high intensities laser fields. Both methods achieve the same percentage of product yields (figure 3b). ’

Q5: Please check the changes made to the sentence ‘Thus ... barrier height’.

A5: Yes, the changes are suitable.

Q6: Please check the sense of the sentence ‘However, ... operations’.

A6: There is a typo in this sentence. This sentence should be ‘However, at a high dimension of density matrix of the wave function, ancilla provides a feasible solution to decompose the unitary operator U into simple additions and other arithmetical operations.’

Q7: Please provide chapter title, date and location for ref. [3].

A7: Ref. [3] can be written as ‘Shor, P. 1994 Algorithms for quantum computation: Discrete logarithms and factoring, in *Proceedings of the 35th Annual Symposium on Foundations of Computer Science*, Santa Fe, NM (IEEE Computer Society Press, Los Alamitos, CA, 1994), pp. 124-134.’

Q8: Please check if ref. [6] is to a book, journal or conference proceedings and supply the complete details as appropriate.

A8: Ref. [6] is to a conference proceedings and can be written as ‘Zalka. C 1996 Simulating quantum systems on a quantum computer, in *Proceedings of the ITP Conference on Quantum Coherence and Decoherence*, Santa Barbara, CA (Royal Society London Press, London, 1998), pp. 313–322.’

Q9: Please provide the article title for refs [43,45].

A9: The title for ref [43] is ‘Ionization in the field of a strong electromagnetic wave’, and the title for ref [45] is ‘Quantum information processing using nuclear and electron magnetic resonance: review and prospects’

Thank you for your kind attention.

Sincerely,

Dr. Jiangfeng Du

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