Entangled state represented by pendulum oscillations

Masataka Ohta
Email: mohta@necom830.hpcl.titech.ac.jp
Department of Computer Science, School of Information Science and Engineering
Tokyo Institute of Technology
2-12-1-W8-54, O-okayama, Meguro, Tokyo 1528552, JAPAN

March 20, 2019

Abstract: Just as a binary quantum state can be represented by oscillations of a pendulum, quantum states involving multiple particles with binary states, including entangled ones, can be represented by oscillations of exponentially many pendulums.

1. Introduction & conclusions

Just as quantum binary state $ae^{i\theta_0}|0\rangle + be^{i\theta_1}|1\rangle$ can be represented by pendulum oscillations of $(\mathrm{Re}(ae^{i(\omega t+\theta_0)}), \mathrm{Re}(be^{i(\omega t+\theta_1)}))$ [1], it is possible to represent quantum states involving multiple particles with binary (or ternary or more) states by oscillations of exponentially many (w.r.t. the number of particles) pendulums. For example, quantum state of $ae^{i\theta_{00}}|00\rangle + be^{i\theta_{01}}|01\rangle + ce^{i\theta_{10}}|10\rangle + de^{i\theta_{11}}|11\rangle$ can be represented by oscillations of two pendulums: $(\mathrm{Re}(ae^{i(\omega t+\theta_{00})}), \mathrm{Re}(be^{i(\omega t+\theta_{01})}))$ and $(\mathrm{Re}(ce^{i(\omega t+\theta_{10})}), \mathrm{Re}(de^{i(\omega t+\theta_{11})}))$. Then, a maximally entangled state of $|00\rangle + |11\rangle$ can be represented as $(\mathrm{Re}(e^{i\omega t}), 0)$ and $(0, \mathrm{Re}(e^{i\omega t}))$.

References

[1] M. Ohta, "Qubit state represented by pendulum oscillations", http://vixra.org/abs/19810.0513.