Entangled state represented by pendulum oscillations

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Abstract: Just as binary quantum state is represented by pendulum oscillations, quantum state involving multiple quanta, including entangled one, can be represented by oscillations of multiple pendulums.

1. Introduction & conclusions

Just as quantum binary state $ae^{i\theta_0}|0\rangle + be^{i\theta_1}|1\rangle$ is represented by pendulum oscillations, ignoring vertical movement, of $(\mathrm{Re}(ae^{i(\omega t+\theta_0)}), \mathrm{Re}(be^{i(\omega t+\theta_1)})) = (a\cos(\omega t + \theta_0), b\cos(\omega t + \theta_1))$ [1], it is possible to represent quantum state involving multiple quanta with binary (or ternary or more) state by oscillations of exponentially many (w.r.t. the number of quanta) pendulums. For example, quantum state involving two binary state quanta: $ae^{i\theta_{00}}|00\rangle + be^{i\theta_{01}}|01\rangle + ce^{i\theta_{10}}|10\rangle + de^{i\theta_{11}}|11\rangle$ is represented by oscillations of two pendulums as $(a\cos(\omega t + \theta_{00}), b\cos(\omega t + \theta_{01}))$ and $(c\cos(\omega t + \theta_{10}), d\cos(\omega t + \theta_{11}))$. Then, a maximally entangled state of $(|00\rangle + |11\rangle)/\sqrt{2}$ is represented as $(\cos\omega t/\sqrt{2}, 0)$ and $(0, \cos\omega t/\sqrt{2})$.

References

[1] M. Ohta, "Qubit state represented by pendulum oscillations", http://vixra.org/abs/1810.0513.