Qiskit WORKING TITLE

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Abstract

The IBM Quantum Experience is a public platform for executing quantum circuits on superconducting back-ends. We execute the Teleportation protocol, Grover's search algorithm, Entanglement Swapping and Entanglement Purification on three superconducting devices available from IBMQ. We analyze the results and DO MORE COOL STUFF.

I. Introduction

Computer simulations have arisen as powerful tools for investigating the molecular dynamics of systems composed of many particles. This report simulates the noble gas Argon at various temperatures and densities, probing the three states of matter, and investigates a set of macroscopic observables, the specific heat, pressure, pair correlation function and diffusion constants of the system. [1]

In order to simulate a system of particles accurately, the first step is to choose an appropriate potential with which to model the interatomic forces exchanged between the particles in motion. We use a mathematically simple model that has been popular historically due to its computational efficiency and which has the added benefit of being especially accurate for noble gases. It assumes dipole-dipole interaction between neutral atoms, and includes a repulsive term for short distances. This is the Lennard-Jones potential, which has the form

II. Conclusion

To conclude, we would like to say a few words about the strengths and limitations of molecular dynamics simulations in general. As we have shown, the observables measured through our simulations have a strong correspondence with well established results in blank, which establishes also the agreement between our simulation and experimental data. Nonetheless, there are regions in our simulation where agreement starts to fail, and these regions in parameter-space highlight the inherent limitations of our simulation. A simulation is only as accurate as the model it implements, and when that simplified model starts to fail (for instance, near critical points when small differences have a large-scale impact on behaviour), the results of any simulation will likewise deteriorate. This pattern is borne out for instance in

References

[1] Michael Nielsen and Isaac Chuang. *Quantum computation and quantum information*. Cambridge New York: Cambridge University Press, 2010. ISBN: 9781107002173.