Quantum Computing at Google

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I will review recent work from the Google Quantum AI group. The long term goal of the group is to build a fault tolerant universal quantum computer [1]. Nevertheless, present day experimental NISQ quantum processors remain a powerful platform for scientific applications. Recent demonstrations include the observation of Time-Crystalline Eigenstate Order [2], and the validation of a promising new hybrid quantum-classical algorithm for quantum chemistry [3].

References

[1] Google Quantum AI, Nature, 595 (2021) 383.
[2] Xiao Mi. et. al., Nature, 601 (2021) 531.
[3] W. J. Hugginset. al., arXiv:2106.16235 (2021).

Figures

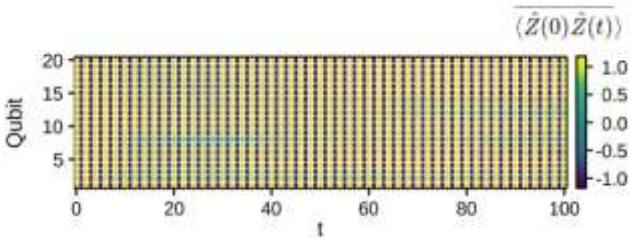

Figure 1: Autocorrelation versus time in a time-crystal experiment. The persistence of correlations over time is indicative of the observation of a time crystal [1].

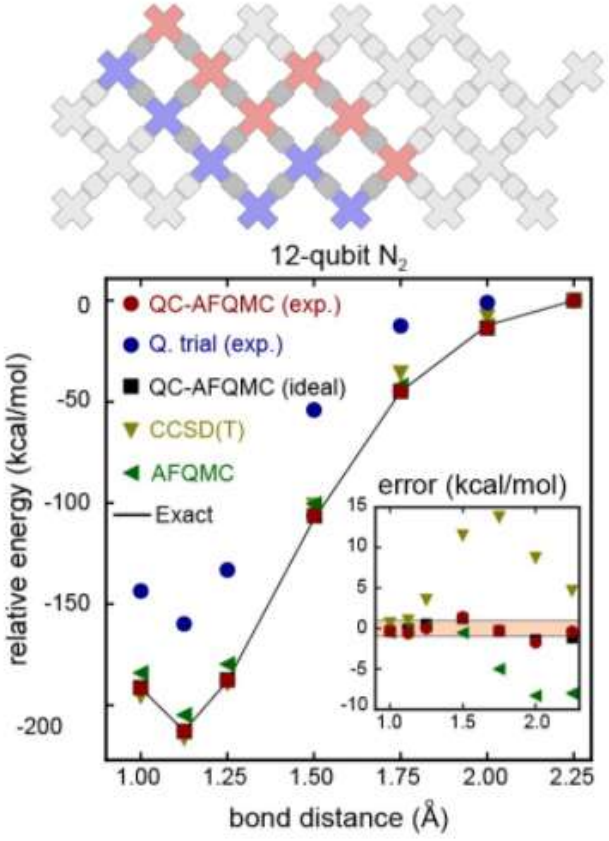

Figure 2: Potential energy surface of N2
Inset shows the error in total energy relative to the exact results in kcal/mol.
We see that a hybrid quantum-classical algorithm (QC-AFQMC) outperformed other state of the art algorithms [2].