

**Project Title:**

**Real time evolution of quantum spin systems using CTMRG**

**Name:**

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1. Background and purpose of the project, relationship of the project with other projects

The aim of the project is to perform numerical simulations regarding the time evolution of quantum systems, with the aim to study 'time crystals' in two dimensions using an algorithm called "CTMRG". CTMRG calculations are generally computationally intensive.

2. Specific usage status of the system and calculation method

The resources have been allocated on 31 January 2025. I have performed multiple runs for a variety of time evolution methods using the square lattice CTMRG. CPUs have been used to run python scripts and I soon hope to switch to GPUs for a more robust results. A lot more computation needs to be performed in order to obtain detailed results that would result in a publication.

3. Result

The current set of computations have been used to benchmark the code with existing results. A lot more computation needs to be performed in order to obtain detailed results that would result in publications.

4. Conclusion

The resources have been in use for the past one month and have been used to benchmark some results.

5. Schedule and prospect for the future

The project is still in the preliminary stage and is expected to run for a few months and will hopefully result in more than one publication.

6. If no job was executed, specify the reason.