**Week 11**

This week has been mainly dedicated to preparing the presentation of the interim report. However, I will summarise some potential interesting avenues to look at as the project develops.

Many-body quantum mechanics is naturally hard to study due the large number of possible states we have at our disposal. Out of equilibrium dynamics, complicates things further as we cease to be in a steady state. Finding ways to simplify the dynamics of these scenarios enables further study into phenomena such as thermalization, quantum transport and entanglement growth.

A coherent description of multiple dynamics on 1D Rydberg atom array I believe will prove useful in studying many-body quantum phenomena. Our project should therefore be focused on providing a rigours description of this. Moreover, we can look to new ways of modelling entanglement propagation through the system (perhaps through a quasiparticle picture).

The physics underlying a 1D Rydberg atom array is very rich and opens up many avenues to understanding equilibrium and non-equilibrium quantum many body dynamics.

\*\*\*EDIT W12\*\*\*

After doing the presentation and getting good feedback I have reflected on a few things. These things are:

* In the text above I use the word ‘rigours’ to describe the goal of describing the system. This is a huge overestimation. If this project has taught me anything is that quantum many-body systems are very complicated! Much more complicated than they seems at first. The richness and depth of the Schrodinger equation for even three interacting atoms is immense. This is precisely why we need quantum simulators and cannot do everything on a laptop!
* The aim of the project should therefore very much tailor to finding ways of describing ‘characteristics’ of the system. And evaluating how possible/useful these measurements are on reaching a consensus on large overarching aspects of the project (thermalisation, entanglement, information propagation...). By no means should the goal be a full ‘coherent’ description of the system. That would be mad!
* With this in mind, the next few weeks are going to be dedicated to evaluating how \*\*effective\*\* different measures are in describing the complex non equilibrium dynamics of our systems. We leave to pros to come up with a ‘quasiparticle’ picture to how entanglement spreads form the local quench – I will be waiting humbly.