This is a short document outlining where I as a team member should begin my research, links are relevant starting points that I found for scholarly articles

1. Strong theoretical foundation

* Braiding statistics of anyons -<https://www.nature.com/articles/s41567-020-1019-1>
* Quantum gates implemented through anyon braiding-[https://www.sciencedirect.com/science/article/pii/S266667582300108X#:~:text=Via%20braiding%20the%20Fibonacci%20anyons,Fibonacci%20anyons%20at%20the%20boundary.](https://www.sciencedirect.com/science/article/pii/S266667582300108X%23:~:text=Via%20braiding%20the%20Fibonacci%20anyons,Fibonacci%20anyons%20at%20the%20boundary.)
* Qubits[-https://pubs.aip.org/aip/apr/article/6/2/021318/570326](https://pubs.aip.org/aip/apr/article/6/2/021318/570326)
* Quantum entanglement-<https://journals.aps.org/rmp/abstract/10.1103/RevModPhys.81.865>
* Superposition (already have a good understanding but not in terms of quantum)- <https://www.nature.com/articles/35017505>
* At least a base foundation of chaos theory, more is preferable-[https://books.google.com/books?hl=en&lr=&id=UXjNCgAAQBAJ&oi=fnd&pg=PP1&dq=chaos+theory&ots=Aaw2RLzlBf&sig=msfDb7rQ5EnE221EzW26yvu9uQY#v=onepage&q=chaos%20theory&f=false](https://books.google.com/books?hl=en&lr=&id=UXjNCgAAQBAJ&oi=fnd&pg=PP1&dq=chaos+theory&ots=Aaw2RLzlBf&sig=msfDb7rQ5EnE221EzW26yvu9uQY%23v=onepage&q=chaos%20theory&f=false)
* Lorenz equations, Lorenz attractors-<https://en.wikipedia.org/wiki/Lorenz_system>
* Perturbation induced chaos-<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.94.214101>
* Quantum Lyapunov exponents -<https://journals.aps.org/pre/abstract/10.1103/PhysRevE.65.046209>
* Bifurcation diagrams in anionic systems- [, https://itp.uni-frankfurt.de/~gros/Vorlesungen/SO/CADS-bifurcations.pdf](,%20https:/itp.uni-frankfurt.de/~gros/Vorlesungen/SO/CADS-bifurcations.pdf)

1. Existing simulations

-current models of quantum systems using anyons, specifically simulation frameworks

-python libraries, Qutip and ProjectQ or Qiskit for quantum computing sim tools  
-python libraries SciPy,Numpy,matplotlib,Sympy

**TODO**

Model basic quantum systems such as single qubit systems to get a grasp on libraries and expected outputs

Model quantum systems such as multi qubit systems and quantum gates for a further understanding of simulation modeling in this space

Model the braiding of two anyons to perform operations after a sufficient base understanding of modeling is achieved, then simulate this in a noisy environment i.e nonlinear perturbation and see what happens

Model a chaotic system through an ODE using python library MatplotLIb (already have some experience)

Research logistic mapping in python

Research Runga-kutta methods for ODE’s

Research bifurcation diagrams and creating one in python