1 Ideas on the general structure

In my talk I am going to present two papers about Quantum Error Correction implementation using two different platforms, superconducting quantum processor and neutral atom quantum processor. While the Google paper is more focused on the experimental proof of the treshold theorem, and the logical error rate of their processor, the Harvard paper is more focused on the general working scheme of their neutral atom platform with a focus on gate implementation and working principles [This explanation should be improved...].

The talk will start with a small introduction about Quantum Error Correction and the main motivations that lead people to start researching in this area. The main difference between Classical and Quantum computation will be outlined. Going forward, there will be an introduction about topological quantum error correction and the formalism needed to understand the following papers. In particular, there will be a basic introduction on the Stabilizer formalism and the Toric code. Additionally, some information about the Steane code (a particular type of colour code) implemented in the Harvard paper, and the more complex surface code used by Google.

At the end, there will be an outline of the main differences between these two platforms and an outlook on what could be improved in the future.

SUMMMARY TABLE:

1. Introduction on Quantum Error Correction: Small recap from the previous talk and highlights of the most important characteristics (challenges?) of quantum computation
2. Brief hystorical recap and evolution of Quantum Error Correction: For example, SHor algorithm, Kitaev's code, Gottesman PhD thesis...
3. Stabilizer formalism: Main defitions and working principles
4. Toric code A small introduction on the topological meaning of the Toric code
5. Surface code and Steane code Only what is useful to understand the figures in the two papers
6. Google paper The main goal of the paper (what they wanted to proove) and the general direction
7. Harvard paper Working principle, platform explanation, C-Not gate implementation with neutral atom?
8. Conclusion and outlook Small recap and confrontation of the two different platforms and an outlook of the future if possible