The Letter Classical Simulation of Quantum Error Correction in a Fibonacci Anyon Code, provides what is, to my knowledge, the first demonstration of an error correction protocol for a quantum memory that is robust against particle creation and diffusion. The article is very well written and solves a substantial open problem by providing an efficient classical simulation of such error processes in a Fibonacci anyon system. However, there are many key details for the algorithm that have been relegated to another article (I suspect a followup PRA paper). As such the Letter does not clearly satisfy the validity requirement of PRL. However, with sufficient revision I believe that this deficiency can be addressed and that after doing so, the article will be an excellent contribution to PRL.

Below I will address the requirements of PRL and discuss why the article does or does not satisfy the requirements. Then I will follow up with a list of changes that I believe will be sufficient to achieve these requirements.

Substance:

"*Validity*.— Work is valid if it is free of detectable error and is presented in sufficient detail that this may be determined. Papers that advance new theoretical views on fundamental principles or theories must contain convincing arguments that the new predictions and interpretations are distinct from existing knowledge and do not contradict experiment."

The article is free of detectable error, but the details of their method are lacking. Also several arguments that are made that are not necessarily convincing; however, given the assumptions that are needed in quantum error correction this fault alone is not necessarily fatal.

"Importance.— Important results are those that substantially advance a field, open a significant new area of research or solve–or take a crucial step toward solving–a critical outstanding problem, and thus facilitate notable progress in an existing field. A new experimental or theoretical method may be a suitable basis for a Letter, but only if it leads to the significant advances presented above. Mathematical and computational papers that do not have application to physics are generally not suitable. Papers that describe proposed experiments must provide compelling evidence that the proposal is novel and feasible, and that it will lead to valuable new research."

The article clearly satisfies this requirement. By giving a threshold estimate for Fibonacci-based quantum computing, the article provides evidence that topological quantum computing using Fibonacci anyons may be practical. This is an important step forward for topological quantum computing, and thus the article satisfies this requirement.

"*Broad Interest*.— Work is of broad interest if it is a major advance in a field of physics or has significant implications across subfield boundaries. A manuscript may also be of broad interest if it is exceptionally pleasing science, aesthetically."

The letter touches several subfields of physics and is also aesthetically pleasing science, so it satisfies these requirements.

Presentation:

The article is exceptionally well written, has clear informative figures and is accessible to a broad audience. However, a major fault with the paper is that it does not provide sufficient background to assess some of the claims. This problem can be addressed through revision.

Changes:

1) For a paper that highlights the efficient simulation algorithm, there is not enough details for the Letter to be assessed independently of the followup work that will go into detail about the data structures and outline of the algorithm (as mentioned in paragraph 2 of page 4). This can be addressed by providing some rough pseudocode as supplemental material that describes the key steps for the algorithm.
2) Page 2, second last paragraph: it is claimed that because simplifying Ising anyon models to include pair creation only sufficed to capture the qualitative features of the problem. It is not clear to me why this ought to also hold for Fibonacci anyons. More discussion or references are needed to backup this claim.
3) Page 4, paragraph 5. "However, calculations of homologically non-trivial operations for small lattice sizes suggest that almost all…" This statement needs to be backed up, either with discussion in the supplemental material showing results from these calculations or an appropriate paper needs to be cited.
4) Caption of figure 4: "This implies the Fibonacci anyon model simulated here is able to perfectly store quantum information for times less than…" I have a minor quibble with this since the value of threshold from this figure is hard to exactly pinpoint, furthermore the data does not cover a very wide range of L relative to the scale of the change in the decoder time. From this standpoint, I'm not convinced that the data implies that the system can perfectly store information below this threshold. Either more data is needed (which may not be practical for larger L) or drawing weaker conclusions from the data would also be appropriate (such as noting instead that it provides strong evidence for the existence of such a threshold).