

My approach to this reviewing task was to fully read:

- (a) sections on which I am an expert, to see if that narrative is technically correct, and
- (b) sections I am less expert on, to see if I could understand them and learn from them.

As per the editor's instructions, and given the length of the review article, I did not read the whole thing in detail. However, I did at least skim the sections I did not read in full.

In inverse relation to the number of pages in the review, which the authors note is roughly equal to the log of the number of string vacua, my report will be fairly short.

In essence, despite the exhaustive length, the quality of the exposition is very high, and consistently so. All of the explanations and summaries I looked at in detail were interesting to read, and surprisingly easy to understand. And, yes, the sections on which I am an expert are accurate, and the sections on which I am not an expert I also found easy to understand and I did learn from them.

The authors are, of course, to be commended on their encyclopaedic thoroughness. No topics of any currency were neglected, including modified gravity theories. The choices they made about how detailed to become (e.g. not trying to cover every single dark matter model ever proposed) are reasonable, and in fact their curation of subject matter is a major reason behind the readability of the paper. The extensive, though not actually exhaustive, references will be an excellent general resource.

As the authors note, the non-gravitational discovery of dark matter, or even a dark matter candidate, will render a fair amount of the material irrelevant in a narrow sense, although the theoretical insights gained through the various "thought experiments" about what the dark matter may be should have some lasting value. But it is a reasonable bet, though I hope I am wrong, that this kind of observational/experimental revelation is still quite some time off. I imagine this review will be a standard reference for many years.

I recommend publication without any revision. I did find the occasional misspelling (i.e. typo) which hopefully can be dealt with by a spell check during production.