Review of: "On the statistical arrow of time"

Alfred Driessen

Potential competing interests: No potential competing interests to declare.

The author writes:

The observer does not possess enough information to state with certainty the positions and velocities of all particles. Perfect knowledge about the position and velocity, or momenta, of each individual particle is lost. The observer loose information about the system over time. It is lost not because of a fundamental violation of information conservation in Nature but merely because of the difficulty for an observer to keep track of all the degrees of freedom.

Contrary to his opinion, there seems to be a fundamental violation of information conservation in Nature. Nicolas Gisin comments on the relationship between information and volume. He writes [Gisin 2019], see also [Bekenstein 2003]:

This argument is based on the assumption that no finite volume of space can contain an infinite amount of information. This is a well accepted result that follows from the holographic principle, known as the Bekenstein bound.

As a consequence, information is fundamentally restricted, and its conservation is no anymore guaranteed. It would be good if the author would mention this possibility or provide arguments that support his own findings.

References:

[Bekenstein 2003] Bekenstein, Jacob, D., *Information in the Holographic Universe*, Scientific American, 289, 2 pp. 58-65.

[Gisin 2019] Gisin, Nicolas, *Indeterminism in Physics, Classical Chaos and Bohmian Mechanics: Are Real Numbers Really Real?* Erkenntnis, https://doi.org/10.1007/s10670-019-00165-8