

Review of: "The Informational Universe of Allah: An Islamic Perspective on Quantum Information Theory"

Harish Parthasarathy¹

¹ Netaji Subhas Inst of Technology

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The authors give a very nice presentation of why God, who created this universe along with human beings to observe the physical world, created it in such a way that quantum mechanics is able to explain its functioning. Specifically, I think that the paper aims at showing that the observer is a part of the system created by God, and if his measurements cause a state collapse leading to the inability of another observer to observe the system in its original state, but rather in the collapsed state, then we should not regard this as an inconsistent view of the physical world. Many physicists have propounded the idea that quantum mechanics is inconsistent because, apart from the unitary evolution of the state, which is reversible, to give meaning to the phenomenon under consideration, we have to have an observer who takes measurements and that the process of measurement is irreversible. However, in my opinion, the current paper suggests that both the phenomenon and the observer are part of a single system that has been created by the almighty God, and hence we should accept such irreversibility associated with measurements as a part of the entire system. I would like to remark that irreversibility is associated with entropy increase in accordance with the second law of thermodynamics, which defines a definite direction of time. However, the Poincaré recurrence theorem for a measure-preserving dynamical system (as, for example, Hamiltonian systems) states that any state will occur infinitely often with unit probability, and hence, after a very, very long time, the state of our universe, including its living entities, will return back to the original state. However, the time taken for recurrence is very, very large, of the order of the life span of our universe, i.e., until the next big bang, and hence, for all practical purposes, the second law of thermodynamics can be taken as valid. This is because the dynamical system's evolution is described by a very, very large number of differential equations, and hence the associated measure-preserving map that defines this evolution acts on a set having a very large number of points, or from the quantum mechanical viewpoint, the evolution operator acts on a Hilbert space of very large dimension. Thus, in my opinion, God created this universe so that it is time-reversible, but within the life span of our universe, irreversibility will be present. The fact that an observer's measurement causes the state to collapse is a process that has also been designed by the almighty so that the universe evolves in a way defined by him. It should also be remarked that even if the entire system of our universe evolves unitarily, a subsystem of this will evolve under an irreversible TPCP (Trace-preserving completely positive) map obtained by partial tracing out the unitary dynamics over the complement of the subsystem. This corresponds classically to integrating out over the dynamical variables corresponding to all particles that are outside the subsystem. Thus, if the observer's mind is also taken to be a part of the system, then, in my opinion, the entire creation of God can be described in a consistent way.

