Thirty Years of Complex Thinking: A Celebration of Stuart Kauffman’s Contributions to the Field of Complex Systems

Noyce Conference Room
Workshop
9:00 am – 5:00 pm
August 21, 2019 – August 22, 2019

"Dipolar Duality: Actuality and Potentiality in Quantum Mechanics"

Michael Epperson
History and Philosophy of Science Group
Department of History &
Center for Philosophy and the Natural Sciences
California State University, Sacramento

ABSTRACT

As argued by Kastner, Kauffman & Epperson ["Taking Heisenberg's Potentia Seriously" International Journal of Quantum Foundations, 4:2 (2018): 158-172], quantum theory is best understood as requiring an ontological dualism of res extensa and res potentia, where the latter is understood per Heisenberg's original proposal, and the former is roughly equivalent to Descartes’ ‘extended substance.’ However, this is not a dualism of mutually exclusive substances in the classical Cartesian sense of mutually exclusive ontological extants. Rather, res potentia and res extensa are properly understood in the Whiteheadian sense of mutually implicative ontological extants, such that each requires reference to the other not only for its formal definition, but more important, for its coherent function in the definition and evolution of quantum mechanical systems. When understood as dipolar ontological relata, potentiality and actuality become foundational to the resolution of key conceptual challenges in quantum theory--in particular, nonlocality, entanglement, null measurements, and wave function collapse.

https://www.santafe.edu/events/thirty-years-complex-thinking-celebration-stuart-k