

# ON THE NATURE OF CAUSALITY IN COMPLEX SYSTEMS

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Big Bang cosmology, chemical and biological evolutionary theory, and associated sciences have been extraordinarily successful in revealing and enabling us to understand the development of the universe from the Planck era to the present, as well as the emergence of complexity, life, and consciousness here on Earth.

After briefly sketching this amazing story, and the key characteristics of nature, this paper will reflect on the different types and levels of causality involved – stressing the important and pervasive role of highly differentiated and dynamic relationships and networks of relationships. Philosophical considerations build on and enrich scientific ones to probe these relationships. They also take us beyond the limits of strictly scientific methodology to consider and model – however inadequately – the ultimate sources of existence and order. This is the issue of creation, which introduces another very different – and transcendent – level of causality. We show that this is compatible with the – and even essential to – the causalities operative in nature, including those of quantum cosmology, if we acknowledge the limits of physics.