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Why science is smooth?

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Our best physical theories mostly involve smooth or continuous (rather than discrete) functions of space, time or energy. Even in quantum theory, which originated with the quantization of energy, the actual state-space of a quantum system is far from discrete, as in the “Bloch sphere” representation of electron spin. The question might naturally be asked: What would happen if these state spaces were discrete? I will first introduce a framework for operationally modelling our observations of nature, and discuss how it can shed light on unexpected connections between state-space structure and fundamental physical principles. I will then review some recent compelling evidence that a principle of reversibility gives rise to the smoothness of the quantum state-space.

Biography

Sabri Al-Safi is an Assistant Lecturer in Mathematics at Nottingham Trent University. He was recently conferred with a PhD in Mathematics from the University of Cambridge. He interests extend to mathematical aspects of quantum foundations as well as post-quantum theories.

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