The Dimensions of Emergent Spacetime in the Influence Network

KEVIN KNUTH, State Univ of NY - Albany — It has been previously demonstrated that the consistent quantification of a causally ordered set of events (influence network) with respect to observers represented by embedded chains results in a unique consistent quantification scheme that reproduces the Minkowski metric in the case of coordinated chains and Lorentz transformations in the case of linearly-related chains (Knuth and Bahreyni 2014). Here we demonstrate that quantification by multiple coordinated chains can only be consistent in the cases of two and four chains resulting in emergent 1+1 and 3+1 dimensional spacetimes, respectively. Odd numbers of chains are specifically ruled out and numbers of chains greater than four lead to a system that is not closed under chain permutation symmetry in a manner consistent with Galois theory. As a result, the spacetime framework that emerges from the consistent quantification of a causally ordered set of events with respect to embedded observers provides a potential foundation for emergent spacetime as well as an explanation as to the significance and nature of 3+1 spacetime dimensions.

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