Causal Sets, Discrete Gravity

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Currently, the work of finding a theory of quantum gravity is as much a struggle to find the right concepts on which to base the theory, as a struggle to do technical calculations correctly. I will argue that from current physics, the concepts of the causal structure of spacetime from General Relativity and the path integral from quantum theory will survive the coming revolution. I will also argue that the main novel concept needed is that of the discreteness or atomicity of spacetime itself. Together these form the foundations of an approach to the problem of quantum gravity, causal set theory that has already been used to make successful observational prediction. Causal set cosmology has much to offer as the standard Lambda-CDM cosmological model comes under ever-increasing pressure from data.