1000-83-37 **Louis Crane*** (`crane@math.ksu.edu`), Mathematics Department, Kansas State University, Manhattan, KS 66506, and **Dan Christensen**. *Causal sites as a foundation for quantum gravity.*

We propose a new structure, which is a synthesis of the idea of a site as a generalization of a topological space with the idea of a causal set as an approximation of a lorentzian manifold. The idea is to model physical spacetime as a relational construct, where relationships between regions replace point sets as the foundations.

We discover that the structure we define has many facets, including the structure of a bisimplicial set, and a weak 2-category, as well as a tangent 2-bundle. Interesting examples also have an intrinsic geometry, which can closely approximate the geometry of a strongly causal lorentzian manifold. We briefly discuss approaches for directly quantizing causal sites as a new approach to quantizing gravity directly. (Received August 02, 2004)