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Topology, coordinates, and fields in Causal Dynamical Triangulations

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Causal Dynamical Triangulations (CDT) is a background independent approach to quantum gravity which introduces a lattice regularization. The framework uses only geometric invariants without referring to any coordinate system.
One of its features is the ability to control the topology of the Universe. The introduction of toroidal spatial topology allows for a definition of hypersurfaces which can serve as reference frames used to construct a coordinate system.
In this talk, I will discuss how to define coordinates, via a classical scalar field, in a way that is invariant under the redefinition of the hypersurfaces.
I will show how the new coordinates give an insight into the geometric structure of configurations appearing in four-dimensional Causal Dynamical Triangulations.

Primary author: GÖRLICH, Andrzej (Jagiellonian University)

Presenter: GÖRLICH, Andrzej (Jagiellonian University)

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