

Ecole Doctorale des Sciences Fondamentales

Title of the thesis: Algebraic and combinatorial properties of finite topological spaces.

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Summary: A quasi-poset is a set endowed with a reflexive and transitive relation. The notion of finite quasi-poset is equivalent to the notion of finite topological space, the open subsets of the topology being given by the final segments. Loïc Foissy, Claudia Malvenuto and Frédéric Patras showed recently that the collection of all finite topological spaces (modulo isomorphism) can be naturally organized in a commutative combinatorial Hopf algebra. A non-commutative version of this object can also be obtained.

Following the aforementioned works, F. Fauvet, L. Foissy and myself enriched the structure with an internal coproduct. The thesis work will consist in exploring a decorated version of this structure, as well as revealing other underlying structures, operadic in particular.

Keywords: trees, graphs, posets, quasi-posets, Hopf algebras, comodule-bialgebras, operads, species.