

# From the Esakia space of the free Heyting algebra on $n$ generators to the $n$ universal model for intuitionistic logic and back.

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## **Abstract:**

The free Heyting algebra on  $n$  generators may be built incrementally by a direct limit of a chain of finite lattices as shown by Ghilardi. The dual inverse limit yields the Esakia space, while an associated direct limit yields the  $n$  universal model, a poset on which we then have a set representation of the free Heyting algebra on  $n$  generators.

In joint work with Serge Grigorieff and Jean-Eric Pin we have identified a topological setting for the study of set representations of distributive lattices, namely these may be viewed as certain ordered uniform spaces. In this setting, the representation of Heyting algebra in its Esakia space is obtained as the ordered uniform space completion of any representation of the algebra on a poset. This, in particular, allows us to obtain the Esakia space of the free Heyting algebra on  $n$  generators from the uniform space corresponding to the set representation of the free Heyting algebra on the  $n$  universal model.