▶ JOHAN LINDBERG, *Constructive semantics and the Joyal-Tierney representation theorem*.

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In this talk I'll describe an ongoing project of further developing the constructive model theory for geometric and first-order logic using complete Heyting Algebra-valued sets. In particular, we study certain locales constructed from the syntax of the theory, some cases of which can be seen as analogues for geometric logic of certain formal topologies first investigated by T. Coquand with collaborators in [1], [2].

Starting from a geometric theory $\mathbb{T}$, the locales X we construct are such that the geometric morphism into the classifying topos **Set**[$\mathbb{T}$] from sheaves on X is an open surjection, hence these locales can be used for representing **Set**[$\mathbb{T}$] in the style of Joyal and Tierney [3]. In fact, our analysis of when this geometric morphism is an open surjection allows us to identify and compare several possible locales that can be used to that end, including spatial ones (a la Butz-Moerdijk [4]) when $\mathbb{T}$ has enough models.

This is joint work with Henrik Forssell, Oslo University.

[1] T. Coquand and J. M. Smith, *An application of constructive completeness*, **Lecture Notes in Computer Science, no. 1158**, Springer-Verlag, 1996.

[2] T. Coquand, S. Sadocco, G. Sambin and J. M. Smith, *Formal Topologies on the set of First-order Formulae*, **Journal of Symbolic Logic**, 2000.

[3] A. Joyal and M. Tierney, *An Extension of the Galois Theory of Grothendieck*, **Memoirs of the American Mathematical Society**, No. 309, 1984.

[4] C. Butz and I. Moerdijk, *Representing topoi by topological groupoids*, **Journal of Pure and Applied Algebra**, 1998.