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*Infinitary cartesian theories: A logic of locally presentable categories*

In 1977, Coste defined a system of restricted first-order logic that was later called *cartesian logic* by Johnstone (cf. Freyd), with finite conjunction and provably unique existential quantification. Coste established a complete deductive system of cartesian logic and showed that the categories of models of cartesian theories are equivalently locally finitely presentable categories.

In this talk on joint work with Andrew Krenz, we define a deductive system of  $\alpha$ -ary *cartesian logic* for a regular cardinal  $\alpha$ , and we prove a completeness theorem for  $\alpha$ -ary cartesian logic. We define a notion of  $\alpha$ -ary cartesian theory, and we show that the categories of models of  $\alpha$ -ary cartesian theories are equivalently locally  $\alpha$ -presentable categories, noting that “limit theories” in the sense of Adámek and Rosický provide special examples of  $\alpha$ -ary cartesian theories. Moreover, building on joint work with Jason Parker, we prove a sharper result for a fixed set of sorts  $S$ , namely that the categories of models of  $S$ -sorted  $\alpha$ -ary cartesian theories are equivalently  $S$ -sorted locally  $\alpha$ -presentable categories in a suitable sense.