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Etale Subobject classifiers in SDG and tangent categories

One aspect of the success of topos theory in geometry is the ability to use a rich internal language to describe geometric constructions. The power of the internal logic of a topos stems from existence of a subobject classifier. However, in settings for abstract differential geometry, tangent categories, one often does not have a subobject classifier.

This talk will discuss work to understand a weaker condition for tangent categories called an étale subobject classifier. Indeed, having an étale subobject classifier in a tangent category is weaker than being a quasitopos. We will explore the logic required to obtain an étale partial map classifier from an étale subobject classifier. We will also explore the resulting logic in the étale subobject fibration which has connectives $\wedge, \top, \exists, \vee, \bot$.

We will then discuss more generally the coherence of partial cartesian closed tangent categories, making use of recent work on tangent categories to characterize tangent bundles abstractly. We will discuss what it means for partial maps to be classified in this setting. To provide a less SDG example, we will discuss partial maps between convenient vector spaces.