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Categorified Geometry through Stacks of 2-Rings. Preliminary report.

There have been several approaches to developing the foundations of a 2-categorical analog of algebraic geometry, notably by Balmer, Rosenberg, and Chirvasitu/Johnson-Freyd. These approaches differ mainly in their notion of a "commutative 2-ring." For example, Balmer uses tensor triangulated categories, while Chirvasitu and Johnson-Freyd roughly define a commutative 2-ring as a suitable symmetric monoidal locally presentable category. In this talk, we outline an approach to "2-algebraic geometry" that utilizes the notion of a "stack of 2-rings," i.e. a stack over a Grothendieck 2-site that takes values in the 2-category of 2-rings in the sense of Chirvasitu/Johnson-Freyd. This can be seen as a vertically categorified sheaf of rings and is a natural extension of the notion of a 2-ring. We show that some basic notions in classical sheaf theory can be generalized to the 2-categorical setting in a straightforward manner using this framework. The notion of a stack of 2-rings therefore provides a particularly flexible framework for 2-algebro-geometric constructions, which can be largely attributed to the clarity of Chirvasitu/Johnson-Freyd's definition. We also discuss future avenues for generalizing other algebro-geometric notions using our theory of stacks of 2-rings. (Received September 18, 2016)