

**Vickers, Steven**

**Sketches for arithmetic universes.** (English) Zbl 1420.18011  
J. Log. Anal. 11, Article FT4, 56 p. (2019).

The author set out a platform of using Joyal's arithmetic universes (AUs) to provide a uniform, base-independent setting for geometric reasoning about toposes as generalized spaces [Math. Struct. Comput. Sci. 9, No. 5, 569–616 (1999; Zbl 0946.18001)]. The aim of the present paper is to give a formal basis for this purpose, while a companion paper [Cah. Topol. Géom. Différ. Catég. 58, No. 3–4, 213–248 (2017; Zbl 1398.18004)] investigates in greater depth the relation with toposes. The main accomplishment of this paper (§8) is the construction of a 2-category  $\mathbf{Con}$  serving as one of generalized spaces, which is analogous to the 2-category  $\mathbf{Top}$  of Grothendieck toposes and geometric morphisms, or, more generally, to the 2-category of bounded  $\mathcal{S}$ -toposes with  $\mathcal{S}$  a chosen base elementary topos with  $\mathbf{mno}$ . It is shown (Theorem 51) that a 2-functor from  $\mathbf{Con}$  to AUs and strict AU-functors, mapping presentations  $\mathbb{T}$  to the presented AUs  $\mathbf{AU}\langle\mathbb{T}\rangle$ , is full and faithful, meaning that the 1-cells and 2-cells have been defined in a sufficiently general manner.

Reviewer: [Hirokazu Nishimura \(Tsukuba\)](#)

**MSC:**

18C30 Sketches and generalizations  
03G30 Categorical logic, topoi

**Keywords:**

[topos](#); [generalized space](#); [geometric theory](#)

**Full Text:** [Link](#)

**References:**

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