1135-53-1166 **Jacob A Gross**, **Daniel R Licata**, **Max S New**, **Jennifer Paykin**, **Mitchell Riley**, **Michael Shulman** and **Felix Wellen*** (felix.wellen@posteo.de). *Differential Cohesive Type Theory.* Preliminary report.

As internal languages of toposes, type theories allow mathematicians to reason *synthetically* about mathematical structures in a concise, natural, and computer-checkable way. The basic system of homotopy type theory provides an internal language for $(\infty, 1)$-toposes, and has enabled a significant line of work on synthetic homotopy theory. By introducing modalities into homotopy type theory, a synthetic treatment of geometric and topological aspects of objects of interest in pure mathematics seems to be possible.

We aim at constructing the rules for an extension of homotopy type theory providing all six operations of what are called differential cohesive toposes. Half of the operations of this structure are comonadic and there is no hope of adding those to the type theory as a list of axioms. With a mode theory in adjoint type theory, we give a basis for a solution with nice specialized rules and five different sorts of context. The rules of this differential cohesive type theory manipulate these contexts in subtle ways, which express the relationships between the modalities.

In work in progress, we are extending this type theory to dependent types, which is not straightforward because of the dependency structure of the differential cohesive modalities. (Received September 20, 2017)