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**EMILY RIEHL**, University of Chicago

*Algebraic model structures*

Algebraic model structures are an extension of Quillen's model categories in which the functorial factorizations define monads and comonads. In the presence of this structure, the (co)fibrations can be regarded as (co)algebras for the (co)monad. The (co)algebra structures witness the fact that a particular map is a (co)fibration and can be used to construct a canonical solution to any lifting problem. For example, the algebraic structure for Hurewicz fibrations is a path lifting function; for Kan fibrations it is a choice of fillers for all horns. Despite this rigid structure, which in particular includes a (co)fibrant replacement (co)monad, algebraic model structures exist for most cofibrantly generated model categories. We describe a few features of this theory and then define and characterize algebraic Quillen adjunctions, in which the functors must preserve algebraic (co)fibrations, not simply ordinary ones. We conclude with a brief discussion of new work defining and characterizing monoidal and enriched algebraic model structures that gives particular emphasis to the role played by "cellularity" of certain cofibrations.