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Unstable algebras over an operad

The aim of this talk is the study of algebraic operations that naturally appear on classical unstable modules over the Steenrod algebra, especially (but not exclusively) those modules that do not come from topological spaces, such as Brown-Gitler modules or Carlsson modules. We will show how the theory of algebraic operads fits into this framework. In characteristic 2, we will define a notion of unstable algebra over an operad relatively to a commutative operation of the operad. Under some hypotheses on the operad \mathcal{P} , on the operation $\star \in \mathcal{P}(2)^{\mathfrak{S}_2}$, and on the unstable module M , we will identify the free \star -unstable \mathcal{P} -algebra generated by M to a free \mathcal{P} -algebra. This will allow us to recollect some results of Steenrod-Epstein and Serre regarding the cohomology of Eilenberg-MacLane spaces, as well as a result of D. Davis on the Carlsson module of weight 1.