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Manuel Rivera* (manuelr@purdue.edu), manuelr@purdue.edu, and **Mahmoud Zeinalian** and **Felix Wierstra**. *The coalgebraic structure of the chains on a space determines the fundamental group.*

I will describe the sense in which the coalgebraic structure of the singular chains on a topological space determines its fundamental group in complete generality. An extension of Adams' classical cobar theorem, from simply connected spaces to spaces with arbitrary fundamental group, lies at the bottom of this new observation. The key idea is to consider the singular chains as an E-infinity coalgebra under a notion of weak equivalence drawn from the Koszul duality theory of co/associative structures.

This result has been used in a recent collaboration with Wierstra and Zeinalian to show that, for any field F , the weak equivalence class of the simplicial cocommutative F -coalgebra of chains on a space X completely determines the fundamental group of X and the homotopy type of the F -localization of the universal cover of X . (Received February 16, 2021)