

# Power maps in algebra and topology

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(Joint work with J. Rognes)

Let  $t : C \rightarrow A$  be a twisting cochain, where  $C$  is a connected, coaugmented chain coalgebra and  $A$  is an augmented chain algebra over an arbitrary PID  $R$ . I'll explain the construction of a twisted extension of chain complexes

$$A \rightarrow H(t) \rightarrow C$$

of which both the Hochschild complex of an associative algebra and the coHochschild complex of a coassociative coalgebra are special cases. We call  $H(t)$  the Hochschild complex of  $t$ .

When  $A$  is a chain Hopf algebra, I'll give conditions under which  $H(t)$  admits an  $r^{\text{th}}$ -power map extending the usual  $r^{\text{th}}$ -power map on  $A$  and lifting the identity on  $C$ . In particular, both the Hochschild complex of any cocommutative Hopf algebra and the coHochschild complex of the normalized chain complex of a double suspension admit power maps. Moreover, if  $K$  is a double suspension, then the power map on the coHochschild complex of the normalized chain complex of  $K$  is a model for the topological power map on the free loops on  $K$ , illustrating the topological relevance of our algebraic construction.