# Isomorphism conjectures with proper coefficients

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Let $G$ be a group and $\mathcal{F}$ a nonempty family of subgroups of $G$, closed under conjugation and under subgroups. Also let $E$ be a functor from small $\mathbb{Z}$-linear categories to spectra, and let $A$ be a ring with a $G$-action. Under mild conditions on $E$ and $A$ one can define an equivariant homology theory $H^G(-, E(A))$ of $G$-simplicial sets such that $H^G_*(G/H, E(A)) = E(A \rtimes H)$. The strong isomorphism conjecture for the quadruple $(G, \mathcal{F}, E, A)$ asserts that if $X \to Y$ is an equivariant map such that $X^H \to Y^H$ is an equivalence for all $H \in \mathcal{F}$, then $H^G(X, E(A)) \to H^G(Y, E(A))$ is an equivalence. We introduce an algebraic notion of $(G, \mathcal{F})$-properness for $G$-rings, modelled on the analogous notion for $G$-$C^*$-algebras, and show that the strong $(G, \mathcal{F}, E, P)$ isomorphism conjecture for $(G, \mathcal{F})$-proper $P$ is true in several cases of interest in the algebraic $K$-theory context.

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