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G-equivariant, bivariant algebraic K-theory

Let G be a group, $\mathcal{F}$ a family of subgroups of G, $\mathcal{C}$ a $\mathbb{Z}$-linear category equipped with a linear G-action, $\mathcal{C} \rtimes G$ the crossed product, and E a functor from $\mathbb{Z}$-linear categories to spectra. The G-equivariant E-homology with coefficients in $\mathcal{C}$ associates a spectrum $H^G(X, E(\mathcal{C}))$ to every G-space X, in such a way that there is a weak equivalence $E(\mathcal{C} \rtimes H) \overset{\sim}{\to} H^G(G/H, E(\mathcal{C}))$. The *isomorphism conjecture* for the triple $(G, \mathcal{F}, E)$ with coefficients in $\mathcal{C}$ says that if $\mathcal{E}_{\mathcal{F}}G$ is a classifying space for G with respect to $\mathcal{F}$, then the map $\mathcal{E}_{\mathcal{F}}G \to G/G = pt$ induces a weak equivalence

$$H^G(\mathcal{E}_{\mathcal{F}}G, E(\mathcal{C})) \overset{\sim}{\to} E(\mathcal{C} \rtimes G)$$

When $\mathcal{C}$ is a C^*-algebra, $\mathcal{F} = \mathcal{F}in$ is the family of finite subgroups $E = K^{\rm top}$ and $\rtimes$ is the reduced C^*-crossed product, this is the Baum-Connes conjecture with coefficients $\mathcal{C}$, and the groups in the left hand side

$$H^G_*(\mathcal{E}_{\mathcal{F}in}G, K^{\rm top}(\mathcal{C})) = KK^G_*(\mathcal{E}_{\mathcal{F}in}G, \mathcal{C})$$

are the Kasparov equivariant bivariant K-theory groups. In the talk I will report about current progress on an old project that aims to describe the left hand side of the isomorphism conjecture for Weibel's homotopy algebraic K-theory in terms of Ellis' G-equivariant bivariant algebraic K-theory.