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Equivariant formality in K-theory

This talk will introduce the notion of equivariant formality in K-theory. For Borel equivariant cohomology theories, equivariant formality is the statement that the Leray–Serre sequence for the fibration $M \to M_G \to BG$ collapses at the E_2 stage, giving an isomorphism $H_G(M) \cong H(M) \otimes H_G(pt)$ as modules over $H_G(pt)$. In the equivariant bundle construction of K-theory, we do not have such a fibration, so we introduce a different definition, that $K(M) \cong K_G(M) \otimes_{R(G)} \mathbb{Z}$, tensoring down rather than tensoring up.

We will prove that compact Hamiltonian G-spaces are always equivariantly formal in K-theory, using as our main tool the Kunneth spectral sequence, and showing that the higher $R(G)$-torsion in $K_G(M)$ vanishes. It follows that the forgetful map $K_G(M) \to K(M)$ is surjective, and as a corollary, we will show that every complex line bundle over M admits a lift of the G-action.

This talk consists of joint work with Megumi Harada.