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An Application of Equivariant $\mathbb{A}^1$-Homotopy Theory to Problems in Commutative Algebra.

Denote by S the (graded) ring $k[x_1, \ldots, x_n]$, where k is a field. There are several open problems in commutative algebra concerning free resolutions of artinian S-modules, or, more generally, concerning differential graded modules over S which have artinian homology. We recast these problems as problems of finding k^*-equivariant maps from an $\mathbb{A}^1$-theoretic sphere to certain moduli spaces, and then we begin the search for obstructions to such maps. (Received September 14, 2009)