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Equivariant cohomology, syzygies and orbit structure

The GKM method is a powerful way to compute the equivariant (and ordinary) cohomology of many spaces with torus actions. So far it has only been applied to so-called equivariantly formal T-spaces, for example to compact Hamiltonian T-manifolds. In this talk I will explain that the GKM method is valid for a much larger class of T-spaces. Our result is based on a new interpretation of a sequence originally due to Atiyah and Bredon, and involves the notion of syzygies as used in commutative algebra. I will also present a surprising relation between the GKM description and the equivariant Poincaré pairing.

This is joint work with Chris Allday and Volker Puppe.