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Kostant-Toda lattices and invariant theory

Toda lattices play a distinguished role in both the classical and modern theories of completely integrable systems, and they are fruitfully studied at the interface of symplectic geometry and representation theory. One crucial aspect of this study is Kostant's Lie-theoretic realization of the open Toda lattice, which one sometimes calls the Kostant-Toda lattice. This construction invokes Kostant's prior works on invariant theory, especially his results on regular Slodowy slices and the structure of the adjoint quotient.

I will discuss invariant-theoretic aspects of the Kostant-Toda lattice, emphasizing two recent developments. The first is a partial compactification of the Kostant-Toda lattice by means of Hessenberg varieties, Slodowy slices, and Mishchenko-Fomenko algebras, and it represents joint work with Hiraku Abe. The second development concerns a Toda-type integrable system on the *universal centralizer*, a hyperkähler manifold arising in certain representation-theoretic contexts.