1136-05-140 **Megumi Harada***, Department of Mathematics and Statistics, 1280 Main Street West, Hamilton, Ontario L8S4K1, Canada, and **Martha Precup**. *The cohomology of abelian Hessenberg varieties and the Stanley-Stembridge conjecture.*

The Stanley-Stembridge conjecture in combinatorics states that the chromatic symmetric function of the incomparability graph of a so-called (3+1)-free poset is e-positive. We will briefly describe this conjecture, and then explain how recent work of Shareshian-Wachs, Brosnan-Chow, among others, makes a surprising connection between this conjecture and the geometry of Hessenberg varieties, together with a certain symmetric-group representation on the cohomology of Hessenberg varieties. In particular, it turns out (a graded version of) the Stanley-Stembridge conjecture would follow if it can be proven that the cohomology of regular semisimple Hessenberg varieties (in Lie type A) are permutation representations of a certain form. I will then describe joint work with Precup which proves this statement for the case of abelian Hessenberg varieties, the definition of which is inspired by the theory of abelian ideals in a Lie algebra, as developed by Kostant and Peterson. Our proof relies on the incomparability graph of a Hessenberg function and previous combinatorial results of Stanley, Gasharov, and Shareshian-Wachs, as well as previous results on the geometry and combinatorics of Hessenberg varieties of Martha Precup. (Received January 09, 2018)