1116-12-291 **Eric Y Chen**, **John T Ferrara*** (jtf019@bucknell.edu) and **Liam M Mazurowski**.
Constructive Galois Theory with Linear Algebraic Groups.

A fundamental aspect of the Inverse Galois Problem is describing all extensions of a base field K with a given Galois group G. A constructive approach to this problem involves the theory of generic polynomials. For a finite group G, a polynomial $f(t_1, \ldots, t_n; x) \in K(t_1, \ldots, t_n)[x]$ is G-generic if $\mathrm{Gal}(f/K(t_1, \ldots, t_n)) \cong G$ and for any Galois G-extension M/L with $L \supset K$, the parameters $t_1, \ldots, t_n$ can be specialized to L such that f has splitting field M/L.

In our work, we show the existence of and explicitly construct generic polynomials for various groups, over fields of positive characteristic. The methods we develop apply to a broad class of connected linear algebraic groups defined over finite fields satisfying certain conditions on cohomology. In particular, we use our techniques to study constructions for unipotent groups, certain algebraic tori, and certain split semisimple groups. An attractive consequence of our work is the construction of generic polynomials in the optimal number of parameters for all cyclic 2-groups over most fields of positive characteristic. This contrasts with a theorem of Lenstra, which states no cyclic 2-group of order ≥ 8 has a generic polynomial over $\mathbb{Q}$. (Received August 22, 2015)