

1048-20-189

**Christopher P Bendel\*** ([bendelc@uwstout.edu](mailto:bendelc@uwstout.edu)), Math, Stats, and Comp Sci Dept, 237 Harvey Hall, University of Wisconsin-Stout, Menomonie, WI 54751. *Cohomology of Frobenius kernels and vanishing of line bundle cohomology*. Preliminary report.

Let  $G$  be a simple algebraic group over an algebraically closed field  $k$  of prime characteristic  $p$ . If  $p$  is greater than Coxeter number of  $G$ , then the cohomology of the first Frobenius kernel of  $G$  can be identified with the coordinate algebra of the nullcone of  $\mathrm{Lie}(G)$ . For small primes, the cohomology algebra has not been determined in general. This talk will briefly discuss recent work with D. Nakano, B. Parshall, and C. Pillen in which identifications were made for some small primes. Two geometric conditions were identified, which, if known to be true, would allow one to identify the cohomology ring in almost all cases. One condition involves the normality of certain varieties and the second involves the vanishing of line bundle cohomology of symmetric powers of the dual of a nilpotent subalgebra of  $\mathrm{Lie}(G)$ . We will discuss the latter condition, a recent algorithm (and computer program) developed by A. Christophersen (in her Aarhus University Ph.D. Thesis) for a group of type  $E_6$  to potentially verify the condition in special cases, and modifications of the original program to arbitrary types made by an undergraduate student J. Mankovecky. (Received February 06, 2009)