

April 27, 2016: Eric Rains (CalTech), *Vinberg representations in awful characteristic*.

Recent work of Bhargava and others on average sizes of Selmer groups relies heavily on a family of representations originally studied by Vinberg. These representations, based on particularly nice gradings of Lie algebras (e.g., mod 2 gradings coming from split real forms), have several properties of intrinsic interest: most notably, they give a large class of representations for which the invariant ring is polynomial. These representations are algebraic, so have finite characteristic analogues, though polynomiality can fail in bad characteristic for the ambient Lie algebra. I'll discuss what happens in the worst possible characteristic (when Vinberg's diagonalization result completely fails), and show that one can still compute the invariant ring, with a surprisingly nice result.