1108-17-324 **Robert Griess*** (rlg@umich.edu). *On integral forms in vertex operator algebras invariant under finite simple groups.*

We report on recent results obtained with coauthors Chongying Dong and Ching Hung Lam. Let V be a vertex operator algebra and G a finite subgroup of $Aut(V)$. Chongying Dong and the speaker proved existence of a G-invariant integral form for V under certain conditions. One application is an integral form for the Moonshine vertex operator algebra which is invariant under its automorphism group, isomorphic to the Monster finite simple group. Dong and the speaker give further conditions for the integral form to be integral as a lattice. Ching Hung Lam and the speaker prove that for every Chevalley group and every Steinberg variation over a finite field F is (up to diagonal and graph outer automorphisms) the full automorphism group of some vertex algebra of classical type over F. Thus, "most" finite groups occur (up to outer automorphisms) as the full automorphism group of vertex algebras. This theory combined with a covering Lie algebra theory of Frohardt and the speaker for certain modular Lie algebras is used to prove a modular moonshine conjecture of Borcherds and Ryba which implies a "theoretical" proof that the sporadic group F_3 of Thompson embeds in the Chevalley group $E_8(3)$. (Received January 17, 2015)