

**Meeting:** 1003, Atlanta, Georgia, SS 32A, AMS Special Session on Arithmetic Algebraic Geometry, I

1003-11-878      **Mark Dickinson\*** ([dickinsm@pitt.edu](mailto:dickinsm@pitt.edu)). *The failure of mod- $p$  multiplicity one.* Preliminary report.

Let  $p$  be a prime and  $\rho$  an irreducible two-dimensional mod- $p$  representation of the absolute Galois group of  $\mathbf{Q}$  that is *modular*, attached to some classical cuspidal modular form. Then  $\rho$  appears as a subrepresentation of the  $p$ -torsion of the Jacobian  $J_1(N)$  of some modular curve  $X_1(N)$ , and this subrepresentation is cut out by a suitable maximal ideal of the ring of Hecke operators acting on  $J_1(N)$ . In many cases  $\rho$  appears with multiplicity precisely one; this fact is used in an essential way in the proof of the Shimura-Taniyama conjecture. I'll discuss some examples where the multiplicity-one condition fails, and their impact on the Taylor-Wiles method. (Received September 30, 2004)