Dirac Equation in Adjoint Representation and Co-adjoint Gauge Theory JAMES CRAWFORD, Penn State Univesity — In the standard model, the Clifford algebra generators in the Dirac equation are taken to be any 4x4 irreducible matrix representation. The generations of particles (each composed of two leptons and two quarks) and the electroweak gauge group (U(1)xSU(2)) are introduced ad hoc. The adjoint and co-adjoint representations of the Clifford algebra are each composed of 16x16 matrices, and these sets are mutually commuting, so neither representation is irreducible, but they form an irreducible set, since only one representation can be brought into block diagonal form (four 4x4 blocks). Consequently, if the adjoint representation is used in the Dirac equation we have four Dirac spinor fields, and the theory exhibits the full gauge invariance generated by the co-adjoint representation, U(2,2), since these representations commute. We discuss the possibility of obtaining the electroweak sector of the standard model in this way.

James Crawford
Penn State University