1043-20-107 **James B Wilson*** (`wilson@math.ohio-state.edu`), 100 Math Tower, 231 West 18th Ave., Columbus, OH 43210. *Using nonassociative rings for p-groups.*

New group isomorphism invariants are introduced for finite p-groups along with polynomial-time algorithms which compute the invariants given standard input methods for p-groups. The invariants have natural $*$-ring, Jordan ring, and Lie ring structures unrelated to the usual nilpotent Lie ring methods for p-groups. The well-known structural properties of these nonassociative rings lead to efficient computation of various familiar group structures including: central and direct product decompositions of maximum possible size, new characteristic subgroups, maximal abelian subgroups, and various characteristic subgroups of the automorphism group of the p-group. Many of the methods apply to broader classes of groups and also lead to a number of open problems.

The talk will stress the tools by focusing on p-groups of class 2 and a couple of the example applications above, while offering hints towards the other applications. (Received August 22, 2008)