J. Riedl. *Classification of the Finite p-Groups Having a Faithful Irreducible Character of Degree p* .

Fix a prime p. The classification problem stated in the title is equivalent to classifying up to isomorphism the nonabelian subgroups of the regular wreath product group $\mathbf{Z}_{p^e} \wr \mathbf{Z}_p$ for an arbitrary positive integer e. We have achieved this classification using the following approach. We have classified up to isomorphism the nonabelian subgroups of a Sylow p-subgroup P of the general linear group $G = \mathrm{GL}(p, q)$, where $q > 1$ is an arbitrary prime-power such that the full p-part of $q-1$ is p^e. This approach is valid because P is isomorphic to $\mathbf{Z}_{p^e} \wr \mathbf{Z}_p$ in case $p^e \geq 3$. In the process, we have showed that every pair of isomorphic nonabelian p-subgroups of G are actually conjugate in G.

In this talk we briefly describe the groups H appearing in this classification. For each such group H, we have also determined the order of its automorphism group $\mathrm{Aut}(H)$. Finally, letting $A = \mathrm{Aut}(P)$, we have proved, for each group H of nilpotence class at least 3 that appears in the classification, that $\mathbf{N}_A(H)/\mathbf{C}_A(H)$ is isomorphic to $\mathrm{Aut}(H)$, which says that the full automorphism group of H is realized inside $\mathrm{Aut}(P)$.