On Schur multiplicators and automorphism groups of p-groups

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In this talk I discuss two applications of the coclass theory for p-groups.

First, I show how coclass theory can be used to find p-groups with trivial Schur multiplicators. My main results are: for every prime $p > 2$ and every r in $\mathbb{N}$, there are at most finitely many p-groups of coclass r with trivial Schur multiplicator, while for every r in $\mathbb{N}$, there are always infinitely many 2-groups of coclass r with trival Schur multiplicator.

Then I consider the divisibility conjecture for automorphism groups of p-groups. This states that for every non-abelian p-group G it follows that $|G|$ divides $|\mathrm{Aut}(G)|$. Again, coclass theory can be used to investigate this problem. My main result here is: there are at most finitely many 2-groups of a fixed coclass which are counterexamples to the divisibility conjecture.