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Campus Delivery, Fort Collins, CO 80523. *New characteristic structure from filters.*

We introduce a general method to make a series of isomorphism invariant subgroups. Even in the extreme case where the only classically known characteristic subgroup is the commutator, this method can produce maximal characteristic series. We tested this on a half billion 2-groups of class 2, the examples for which isomorphism invariants are least known. We succeeded in identifying new subgroups in about 97% of the groups we surveyed, and our approach can be adapted for further improvement. Our strategy begins with a structure theorem on the cohomology of nilpotent groups and techniques in nonassociative algebra. We report on individual and joint work with J.B. Wilson. (Received September 07, 2016)