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365 Fifth Avenue, New York, NY 10016. *How tall is the automorphism tower of a group?*

The automorphism tower of a group is obtained by computing its automorphism group, the automorphism group of *that* group, and so on, iterating transfinitely. Each group maps into the next using inner automorphisms and one takes a direct limit at limit stages. The automorphism tower problem is the question whether this process ever terminates, whether one ever arrives at a group that is isomorphic to its automorphism group by the natural map. Wielandt (1939) proved the classical result that the automorphism tower of any finite centerless group terminates in finitely many steps. This was gradually generalized to successively larger collections of groups until Thomas (1985) proved that every centerless group has a terminating automorphism tower. Building on this, I proved (1998) that in fact every group has a terminating transfinite automorphism tower. In this talk, I will describe the proof. In addition, I will discuss some joint work with Thomas and Fuchs that tends to reveal the set-theoretic essence of the automorphism tower of a group: the very same group can have wildly different automorphism towers in different models of set theory. Numerous easy-to-state questions remain open. (Received January 22, 2010)