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Equivalence relations on permutations and pattern avoidance

Usually when one studies pattern avoidance of permutations one fixes a particular pattern and counts the permutations that avoid the pattern. In this talk we will study the same counting problem when permutations are placed into equivalence classes with respect to some relation. Then the sizes of the classes that entirely avoid a pattern are added up. This leads to some new and interesting counts.

Three particular relations will be discussed, conjugacy, Knuth equivalence and toric equivalence. The first one allows one to identify the permutations that do not contain a cycle of a prescribed length; the second one provides a new proof of the count for permutations avoiding 231 and 213; and the last one gives some surprising connections with number theory.