Unlabeled $(2+2)$-free posets, ascent sequences and pattern avoiding permutations

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We present bijections between four classes of combinatorial objects. Two of them, the class of unlabeled $(2+2)$-free posets and a certain class of chord diagrams (or involutions), already appear in the literature. The third one is a class of permutations, defined in terms of a new type of pattern. The fourth class is formed by certain integer sequences, called ascent sequences, which have a simple recursive structure.

Using the simple recursive structure we determine the generating function of these classes of objects, thus recovering a series obtained by Zagier for chord diagrams. That this series also counts $(2+2)$-free posets seems to be new.

This is joint work with Mireille Bousquet-Mélou (LaBRI, Université Bordeaux 1), Mark Dukes (University of Iceland) and Sergey Kitaev (Reykjavik University).