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**TAXONOMIZING PERMUTATION-BASED COMBINATORIAL OPTIMIZATION PROBLEMS
BY MEANS OF THE FOURIER TRANSFORM**

Combinatorial optimization problems have a high relevance in practical applications such as scheduling, timetabling, routing, etc. While these problems can be exactly solved in the case of small dimension by classical operations research algorithms such as branch and bound, real problems are dealt with heuristic algorithms. Heuristic algorithms do not come with theoretical guarantees but provide good solutions in affordable computation time.

However the question of which heuristic to choose given a particular combinatorial optimization problem is unsolved. In this talk we try to advance in this goal by elaborating on a taxonomy of combinatorial optimization problems based on the behaviour of heuristic algorithms. This taxonomy is based on the Fourier transform in groups. Particularly we will give some examples on problems defined on the space of permutations and in binary spaces.