

Institut für Diskrete Mathematik

**Vortrag im Seminar Kombinatorik und Optimierung**

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## **Exact approaches and approximation results for knapsack problems with side constraints**

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We propose exact solution approaches for two different generalization of the 0-1 Knapsack Problem, that is the 0-1 Knapsack Problem with Setups and the 0-1 Collapsing Knapsack Problem. In the first problem, the items belong to disjoint families (or classes) and they can be picked only if the corresponding family is activated. The selection of a class involves setup costs and resource consumptions thus affecting both the objective function and the capacity constraint. In the 0-1 Collapsing Knapsack Problem, the capacity of the knapsack is not a scalar but a non-increasing function of the number of items included, namely it is inversely related to the number of items placed inside the knapsack. The solution approaches we propose rely on an effective exploration of a specific set of variables that leads to solve standard knapsack problems and on dynamic programming. For the Knapsack Problem with Setups, a series of approximation results is also provided.

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