Daniel Brosch (Leverkusen, Germany, 1996) received his bachelor's and master's degrees in Mathematics with honors at the University of Cologne (2017 & 2018). After that he started as PhD candidate at the department of econometrics & OR at Tilburg University, as part of the Marie-Curie innovative training network MINOA.

This dissertation explores different approaches to and applications of symmetry reduction in convex optimization. Using tools from semidefinite programming, representation theory and algebraic combinatorics, hard combinatorial problems are solved or bounded. The first chapters consider the Jordan reduction method, extend the method to optimization over the doubly nonnegative cone, and apply it to quadratic assignment problems and energy minimization on a discrete torus. The following chapter uses symmetry reduction as a proving tool, to approach a problem from queuing theory with redundancy scheduling. The final chapters propose generalizations and reductions of flag algebras, a powerful tool for problems coming from extremal combinatorics.

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