

# PROPOSITIONAL PROOF SYSTEMS IN COMBINATORIAL OPTIMIZATION

SEBASTIAN POKUTTA

The connection between propositional proof systems and combinatorial optimization has long been of interest to computer scientists, logicians, and mathematicians alike. For example, deriving valid inequalities for a given combinatorial optimization problem is equivalent to deriving a valid statement within an associated propositional proof system. Similarly, establishing unsatisfiability of a formula is equivalent to showing that the associated polytope of feasible points with coordinates in  $[0, 1]$  does not contain any 0/1 point. Exploiting the underlying polyhedral structure, we will show that for certain types of formulas all potential proofs of unsatisfiability are long, having a depth of at least  $\Omega(n/\log n)$ , independently from the chosen proof system. (Joint work with Andreas S. Schulz)

S. POKUTTA, DEPARTMENT OF MATHEMATICS, UNIVERSITY OF DARMSTADT, 64289 DARMSTADT, GERMANY

*E-mail address:* `sebastian.pokutta@mac.com`