Nondeterministic Instance Complexity and Proof Systems with Advice

Olaf Beyersdorff

Institut für Theoretische Informatik, Leibniz Universität Hannover, Germany
beyersdorff@thi.uni-hannover.de

Motivated by strong Karp-Lipton collapse results in bounded arithmetic, Cook and Krajíček have recently introduced the notion of propositional proof systems with advice. In this talk we investigate the following question: *Do there exist polynomially bounded proof systems with advice for arbitrary languages?* Depending on the complexity of the underlying language and the amount and type of the advice used by the proof system, we obtain different characterizations for this problem. In particular, we show that for a language L, the above question is tightly linked with the question whether L has small nondeterministic instance complexity.

The results described in this talk are joint work with Johannes Köbler and Sebastian Müller (Humboldt-University Berlin).