

## Constraint Satisfaction and linear width

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Local consistency methods play an important role in the study of the constraint satisfaction problem (CSP) among other reasons because this family of methods, under several different but equivalent embodiments, can be studied from the point of view of logic (as Datalog Programs), combinatorics (as dualities), and algebra (via the study of the properties of the algebra associated to a CSP).

The most general form of local consistency, which can be defined equivalently as  $k$ -consistency or relational consistency, has received a lot of attention as it constitutes one of the most powerful tools to show that a CSP is solvable in polynomial time. Recently, Barto and Kozik have characterized completely the reach of this method in algebraic terms (see L. Barto's talk).

In this talk we want to focus on a different variant of consistency which was introduced, in the context of logic, via definability by linear datalog programs, leading to the notion of linear width. This concept is motivated by the fact that a CSP with bounded linear width falls into the class  $NL$  of problems solvable in non-deterministic logarithmic space. It is known, similarly to other notions of local consistency, that if two CSPs are associated to the same algebra then either both or none have linear width, so that one can speak of algebras of bounded linear width.

We plan to give an strategy-based definition of this type of consistency, more amenable to algebraic treatment than linear Datalog Programs, and discuss the only (and very modest) general condition known so far for bounded linear width: that of having a majority term operation (a result obtained in collaboration with A. KROKHIN).