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NEWTON POLYHEDRA THEORY FOR GENERICLY INCONSISTENT SYSTEMS OF EQUATIONS

Consider a system of equations

$$P_1 = \cdots = P_k = 0$$

in $(\mathbb{C}^*)^n$, where $P_1, \ldots, P_k$ are Laurent polynomials with the supports $A_1, ..., A_k \subset \mathbb{Z}^n$. Assume that the generic system with fixed supports $A_1, ..., A_k$ is inconsistent.

Problem. Compute discrete invariants of $X \subset (\mathbb{C}^*)^n$ defined by a system of equations which is generic **in the set of consistent systems** with supports $A_1, \ldots, A_k$.

I will show how to solve this problem by reducing it to the theory of Newton polyhedra. Unlike the classical situation, not only the Newton polyhedra of $P_1, \ldots, P_k$, but also the supports $A_1, \ldots, A_k$ themselves are relevant. That is, it is not enough to consider only the convex hulls.