# On the Effective Putinar's Positivstellensatz and Convergence Rates in Polynomial Optimization

Lorenzo Baldi

February 20, 2022

**Abstract**

Considering the problem of minimizing a polynomial function over a semialgebraic set, Lasserre introduced hierarchies of convex relaxations that allow one to compute lower approximations of the minimum. The general, theoretical convergence rate is deduced from effective versions of Putinar's Positvstellensatz. We give new polynomial bounds for this theorem: these bounds involve a Łojasiewicz exponent associated to the description of the semialgebraic set and, under regularity conditions, are related to the smallest singular value of the Jacobian matrix of the defining inequalities.

Based on joint works with Bernard Mourrain and Adam Parusiński.