CARLOS BELTRAN, University of Toronto, Department of Mathematics, Toronto, Ontario M5S 2E4, Canada
On the complexity of approximating solutions of systems of polynomial equations

Let $f = (f_1, \ldots, f_n)$ be a system with n equations and n complex unknowns. An approximate zero of f is an affine point such that the successive iterations of Newton's method converge quadratically to an exact zero of the system.

I will present an Average Las Vegas numerical procedure, joint work with L. M. Pardo, guaranteed to produce approximate zeros of systems of equations in polynomial time, on the average.

I will also introduce some very recent results, joint work with M. Shub, that suggest the existence of much faster algorithms, with average running time almost linear in the size of the input. The search of such an algorithm is linked to the study of a geometrical problem: The geodesics in the "condition number metric". Open questions, both from complexity and geometrical perspectives, will be discussed.