1067-68-1706 **Luca Trevisan*** (trevisan@stanford.edu), Computer Science Department, 474 Gates Building, 353 Serra Mall, Stanford, CA 94305-9025. *Khot's Unique Games Conjecture: its consequences and the evidence for and against.*

The theory of NP-completeness, developed in the early 1970s by Cook, Karp, Levin, and others, provides a conjectural approach to studying the computational complexity of several combinatorial problems. Under the widely believed conjecture that $P \neq NP$, proving that a problem is NP-complete implies that the problem does not admit a polynomial time algorithm.

The theory of Probabilistically Checkable Proofs (PCPs), developed in the 1990s, extended this approach to problems involving the search for *approximate solutions* to combinatorial optimization problems, establishing that for many problems the best possible polynomial time computable approximation guarantees are given by known algorithms (assuming $P \neq NP$).

Khot's Unique Games Conjecture (UGC), formulated in 2002, is a conjectural statement about the existence of certain PCP systems. If $P \neq NP$ and UGC holds, then a series of highly non-trivial results (involving techniques from geometry, harmonic analysis and probability) from the past eight years characterized the approximability of several additional problems.

We will discuss the evidence for and against the conjecture, and give a sample of the rich set of mathematical discoveries that have been motivated by it. (Received September 21, 2010)