1077-05-832 **Joel Spencer***, 251 Mercer St, New York, NY 11733. *Finding Needles in Exponential Haystacks.* Preliminary report.

The probabilistic method, aka Erdős Magic, is a powerful methodology that allows one to prove the existence of a combinatorial object (e.g., a coloring) by examining an appropriately defined random object and showing that it has positive probability of satisfying the desired criteria. In some critical cases, this positive probability is exponentially small, leaving the question of algorithmic implementation.

We discuss two recent successes in algorithmic implementation. The Lovász Local Lemma is a probabilistic sieve result which is very effective when events are mostly independent. Recent work of Robin Moser (together with Gábor Tardos and others) allows implementation via a very simple "fix-it" algorithm, though proving the effectiveness of the algorithm is quite subtle.

A quarter century ago this speaker showed that given an n sets on n elements there was a two-coloring of the underlying elements so that all sets had discrepancy less than $6\sqrt{n}$. A random coloring has only exponentially small chance of succeeding. Using semidefinite programming and making a clear advance on the pioneering work of Goemans and Williamson, Nikhil Bansal has given an algorithmic implementation for this problem, and a number of problems involving discrepancy. (Received September 13, 2011)