Abstract:

In this talk, we will discuss some questions related to polynomial approximations of AC0. A classic result due to Tarui (1991) and Beigel, Reingold, and Spielman (1991), states that any AC0 circuit of size \( s \) and depth \( d \) has an \( \epsilon \)-error probabilistic polynomial over the reals of degree at most \((\log (s/\epsilon))^{O(d)}\). We will have a re-look at this construction and show how to improve the bound to \((\log s)^{O(d)} \log (1/\epsilon)\), which is much better for small values of \( \epsilon \). As an application of this result, we show that \((\log s)^{O(d)} \log (1/\epsilon)\)-wise independence fools AC0, improving on Tal's strengthening of Braverman's theorem that \((\log (s/\epsilon))^{O(d)}\)-wise independence fools AC0. Time permitting, we will also discuss some lower bounds on the best polynomial approximations to AC0.

Joint work with Srikanth Srinivasan.