ABSTRACT -
Reconstruction of arithmetic circuits has been heavily studied in the past few years and has connections to proving lower bounds and deterministic identity testing. In this talk we present a polynomial time randomized algorithm for reconstructing depth-3 circuits with fan-in 2 at the top addition gate and having coefficients from a characteristic zero field.

The algorithm needs only a black-box query access to the polynomial, runs in time polynomial in input size and returns a circuit (from the above model) computing the polynomial (with high probability).

Our main techniques are based on the use of Quantitative Sylvester Gallai theorems from recent work of Barak et.al., to find a small collection of "nice" sub-spaces onto which we restrict our input polynomial. The heart of our work lies in applying these theorems to prove why restrictions w.r.t. the "nice" sub-spaces can be ”glued”. We also use "Brill’s Equations" to construct a set of linear forms which are computed at the first computational (from the bottom) layer of our arithmetic circuit.

BRIEF BIO -
Gaurav Sinha works as an Applied Scientist at Microsoft BingAds Labs located in Silicon Valley California. He currently works on problems at the intersection of Auction Theory and Machine Learning with a practical flavor. He is also interested in Theoretical Computer Science specifically Algebraic Complexity. Prior to Microsoft, Gaurav was a PhD student in mathematics at the California Institute of Technology, where he worked with Prof. Eric Rains on Association Schemes.