

Title: Some Recent Advances in Polynomial Optimization

Abstract: Optimization problems involving polynomial functions are of great importance in applied mathematics and engineering, and they are intrinsically hard problems. They arise in important engineering applications such as the sensor network localization problem, and provide a rich and fruitful interaction between algebraic-geometric concepts and modern convex programming.

The talk will be divided into two parts. In the first part, I will describe the key results in this exciting area, highlighting the geometric and conceptual aspects as well as recent work on exact semi-definite program relaxation for polynomial optimization problems. In the second part, I will explain how the semi-algebraic structure helps us to analyse the explicit convergence rate of some important and powerful algorithms such as alternating projection algorithm, proximal point algorithm and Douglas-Rachford algorithm. Applications to tensor computations and sparse optimization problems will be discussed (if time is permitted).