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**Rekha R Thomas\*** (rrthomas@uw.edu). *Sum of squares polynomials in optimization.*

Polynomials that are nonnegative over the reals have been studied by mathematicians for over a century and were the topic of Hilbert's 17th problem. The classical technique for certifying the nonnegativity of a polynomial is to express it as a sum of squares of polynomials when possible. This can be cast as a "semidefinite program", a modern tool in optimization that generalizes linear programming. These connections have allowed sums of squares polynomials to play an important role in optimization with fascinating geometry and many open questions. In this talk I will explain some of the main uses of nonnegative and sums of squares polynomials in optimization and how different types of mathematics and computational challenges naturally intertwine to produce results here. In the four accompanying talks in this session you will see some of the myriad dimensions of this fascinating interdisciplinary subject in both theory and applications. (Received September 14, 2011)