Welcome to the World of SONCs
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Deciding nonnegativity of real polynomials is a fundamental problem in real algebraic geometry and polynomial optimization. It is well-known that in general this problem is very hard, therefore one is interested in finding certificates for nonnegativity, which are easier to check. Since the 19th century, sums of squares (SOS) are a standard nonnegativity certificate, which can be detected using semidefinite programming (SDP).
This approach, however, has some issues, especially in practice if the optimization problem has many variables or high degree.

In this talk, I will introduce sums of nonnegative circuit polynomials (SONCs), which lead to an entirely new class of nonnegativity certificates independent of sums of squares. I will present some convex geometric properties of the SONC cone and moreover I will
provide an overview of the application of SONC polynomials to polynomial optimization problems.

The talk is based on joint work with Sadik Iliman, Adam Kurpisz, and Timo de Wolff.