Alexander Belton, Dominique Guillot, Apoorva Khare* (khare@stanford.edu) and Mihai Putinar. Schur polynomials and linear matrix inequalities for Hadamard powers.

We characterize the polynomials of degree $N > 0$, which when applied entrywise to the cone of positive $N \times N$ matrices, preserve positivity. This result provides a quantitative version in fixed dimension of Schoenberg’s celebrated theorem. By recasting our result as a tight linear matrix inequality for matrix pencils, we derive asymptotically sharp bounds for the matrix cube problem for Hadamard powers. The proof of our result makes use of a novel determinantal identity involving Schur polynomials. (Received September 02, 2016)