1145-46-1054 **Igor Klep*** (igor.klep@auckland.ac.nz), The University of Auckland, Department of Mathematics, Private Bag 92019, Auckland, 1142, New Zealand. *Noncommutative polynomials describing convex sets.*

The seminal 2012 theorem of Helton and McCullough states that every semialgebraic matrix convex set is given by a linear matrix inequality (LMI). The purpose of this talk is two-fold. First, we prove that every irreducible polynomial f with convex semialgebraic set D_f must be of degree at most 2 and concave. Second, we present effective algorithms for (a) checking whether D_f is convex; (b) finding an LMI representation $D_f = D_L$ for convex D_f. Techniques employed include realization theory, noncommutative algebra and semidefinite programming.

This is joint work with Bill Helton, Scott McCullough, and Jurij Volčič. (Received September 18, 2018)