1057-52-303 **Ivan Soprunov** (i.soprunov@csuohio.edu), 2121 Euclid Ave. RT 1536, Cleveland State University, Cleveland, OH 44115, and **Jenya Soprunova*** (soprunova@math.kent.edu), Summit Street, Kent State University, Kent, OH 44242. *Minimum distance for toric codes and geometry of lattice polytopes.*

Fix a convex lattice polytope P in $\mathbb{R}^n$, and define $\mathcal{L}_P$ to be the $\mathbb{F}_q$-vector space spanned by the monomials whose exponent vectors lie in P. The codewords of a *toric code* are obtained by evaluating polynomials in $\mathcal{L}_P$ at the points of the torus $(\mathbb{F}_q \setminus \{0\})^n$, taken in some fixed order. The question of computing or giving bounds on the minimum distance of toric codes has been studied by Hansen, Joyner, Little and Schenk, and others.

In this talk, I will explain our results that demonstrate a strong connection between the minimum distance of a toric code and the geometry of its lattice polytope P. In the surface case, $n = 2$, we came up with new lower bounds for the minimum distance which involve a geometric invariant $L(P)$, the full Minkowski length of a polygon P. For higher-dimensional toric codes, we have shown that the minimum distance is multiplicative with respect to taking the product of polytopes, and behaves in a simple way when one builds a k-dilate of a pyramid over a polytope. This allowed us to construct a large class of examples of higher-dimensional toric codes where we can compute the minimum distance explicitly. (Received January 25, 2010)