Abstract. Let $P$ and $Q$ be convex polytopes in $\mathbb{R}^n$. Their Minkowski sum is

$$P + Q = \{ p + q \in \mathbb{R}^n \mid p \in P, q \in Q \},$$

which is again a convex polytope. Below is the Minkowski sum of a triangle and a square.

Notice that the vertices of $P$ and $Q$ in this picture have integer coordinates. Such polytopes are called lattice polytopes. The central object of my talk is the Minkowski length $L(P)$ of a lattice polytope $P$, which is defined to be the largest number of non-trivial primitive segments whose Minkowski sum lies in $P$. For example, in the picture above $L(P) = 1$, $L(Q) = 2$, and $L(P + Q) = 3$.

The Minkowski length represents the largest possible number of factors in a factorization of polynomials with exponent vectors in $P$, and shows up in lower bounds for the minimum distance of toric codes.

I will present some results about Minkowski length which are important when studying the minimum distance of a toric code defined by a 2D or a 3D polytope $P$.

The 2D results appear in our joint paper with Ivan Soprunov. The 3D results were obtained in last summer’s REU together with Olivia Beckwith, Matthew Grimm, and Bradley Weaver.

* Refreshments at 2:30 PM in RT 1517