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Toric surface codes of small dimension

Toric codes are a class of error-correcting codes introduced by Hansen, where a code C is a k-dimensional subspace of $\mathbb{F}_q^n$, coming from a lattice polytope defining a toric variety. In particular, a toric surface code of dimension k is generated by some lattice convex polytope $P \subset \mathbb{R}^2$, where k is the number of lattice points in P. In this talk I'll discuss what is known about toric surface codes of small dimension $(k = 4, 5, 6)$, and how one uses algebraic geometric techniques to analyze such a code. Building on previous work of Soprunov and Soprunova as well as Luo, Yau, Zhang, and Zuo, we'll extend the classification of toric surface codes to dimension $k = 7$. This is joint work with Emily Cairncross, Eli Garcia and Stephanie Ford.