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Complex abelian varieties and quantum error correction

I will explain how the theory of complex abelian varieties provides a natural and rigorous framework for one of the leading approaches to quantum error correction, known as GKP codes. This makes the tools of complex geometry directly applicable to a concrete and active area of quantum computing. In particular, we show that GKP codes correspond exactly to polarized complex abelian varieties, and that their main features become familiar geometric objects: code states are theta functions, an important class of logical gates comes from automorphisms, and robustness to noise is governed by systolic invariants. Conversely, natural questions in quantum error correction become problems in complex geometry, such as optimization over moduli spaces of polarized abelian varieties. No prior background on quantum error correction will be assumed. This talk is based on joint work with Baptiste Royer, arXiv:2605.28784.