SEMINARIO

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Entanglement-assisted Quantum Codes from Algebraic Geometry Codes

Abstract: Quantum error correcting codes play the role of suppressing noise and decoherence in quantum systems by introducing redundancy. Some strategies can be used to improve the parameters of these codes. For example, entanglement can provide a way for quantum error correcting codes to achieve higher rates than the one obtained via traditional stabilizer formalism. Such codes are called entanglement-assisted quantum (QUENTA) codes. In this talk, we use algebraic geometry codes to construct several families of QUENTA codes via Euclidean and Hermitian construction. Three of the families created has maximal entanglement and achieve quantum Singleton bound.

At the end, asymptotically good tower of linear complementary dual codes is used to obtain an asymptotically good families of maximal entanglement QUENTA codes with nonzero rate, relative minimal distance, and relative entanglement. Furthermore, a simple comparison with the quantum Gilbert-Varshamov bound demonstrates that from our construction it is possible to create an asymptotically family of QUENTA codes that exceed such this bound.

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