



## Seminar/Talk

# GKP code error-correction with robust ancilla error suppression

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The GKP code allows for generic error-correction of a qubit encoded in a harmonic oscillator. Recent experiments have demonstrated the stabilization of the code manifold based on Rabi interactions with an ancillary two-level system. However, these schemes suffer from uncorrectable logical flips triggered by ancilla relaxation errors during the interaction. We propose a protocol to stabilize the GKP code in a target mode by mapping its error syndromes to an ancillary GKP mode via a quadrature-quadrature interaction. In contrast to previously proposed schemes, coupling to solely one ancilla quadrature allows tailoring the ancilla state and its preparation accordingly to ensure a strong suppression of back-propagating errors to the target mode. The error-syndrome information is retrieved and the ancilla efficiently re-initialized using similar techniques demonstrated in the recent GKP experiments. For realistic system parameters, numerical simulations confirm the robust suppression of ancilla induced logical errors and show an enhancement of the logical qubit lifetime by an order of magnitude beyond the break-even point.

**Thursday, July 27, 2023 01:00pm - 02:00pm**

Office Bldg West / Ground floor / Heinzl Seminar Room (I21.EG.101)



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