

(EQuaLS2022) Expository Quantum Lecture Series 2022

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INTRODUCTION TO QUANTUM ERROR CORRECTION WITH QUBITS AND HARMONIC OSCILLATORS

PROF. DR. ARNE L. GRIMSMO
University of Sydney, AUSTRALIA

ABSTRACT

One of the most stunning discoveries in quantum information science is that quantum information can be processed reliably even in the presence of noise using quantum error correcting codes. In this lecture series I will introduce the concepts behind quantum error correction, first with two-level systems, or qubits, as information carriers, and subsequently with quantum harmonic. I will also discuss recent experimental progress by groups around the world on realizing quantum error correction using such harmonic oscillator codes, and some of the advantages this approach may offer longer term.