Unitary Error Basis

ian.mcloughlin@atu.ie

Last updated: 26 September 2023

Pauli Matrices

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$$

Inner Product

A, B: $d \times d$ matrices.

$\langle A, B \rangle = \text{tr}(A^*B)/d$

$\text{tr}(A) = \sum_i a_{ii}$

Conjugate Transpose

$A^* = A^{\mathsf{H}} = A^{\dagger} = \bar{A}^{\mathsf{T}}$

$$\begin{bmatrix} i & 2+i \\ 1 & 3-2i \end{bmatrix}^* = \begin{bmatrix} -i & 1 \\ 2-i & 3+2i \end{bmatrix}$$

Trace

$\text{tr}(A) = \sum_i a_{ii}$

$\text{tr}(A \otimes B) = \text{tr}(A)\text{tr}(B)$

$\text{tr}(cA) = c\,\text{tr}(A)$

$\text{tr}(A) = \sum_i \lambda_i$