Quantum Latin Squares

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Quantum Latin Square

An $n \times n$ array of elements in $\mathbb{C}^n$ such that each row and each column is an orthonormal basis.

Benjamin Musto and Jamie Vicary. Quantum latin squares and unitary error bases, 2016

Example

$\|0\rangle$	$\|1\rangle$	$\|2\rangle$	$\|3\rangle$
$\frac{1}{\sqrt{2}}(\|1\rangle - \|2\rangle)$	$\frac{1}{\sqrt{5}}(i\|0\rangle + 2\|3\rangle)$	$\frac{1}{\sqrt{5}}(2\|0\rangle + i\|3\rangle)$	$\frac{1}{\sqrt{2}}(\|1\rangle + \|2\rangle)$
$\frac{1}{\sqrt{2}}(\|1\rangle + \|2\rangle)$	$\frac{1}{\sqrt{5}}(2\|0\rangle + i\|3\rangle)$	$\frac{1}{\sqrt{5}}(i\|0\rangle + 2\|3\rangle)$	$\frac{1}{\sqrt{2}}(\|1\rangle - \|2\rangle)$
$\|3\rangle$	$\|2\rangle$	$\|1\rangle$	$\|0\rangle$

$\|0\rangle$	$\|1\rangle$	$\|2\rangle$	$\|3\rangle$
$\|1\rangle$	$\|2\rangle$	$\|3\rangle$	$\|0\rangle$
$\|2\rangle$	$\|3\rangle$	$\|0\rangle$	$\|1\rangle$
$\|3\rangle$	$\|0\rangle$	$\|1\rangle$	$\|2\rangle$

Figure 1: From Latin Square.