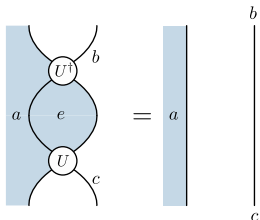


Quantum Latin squares

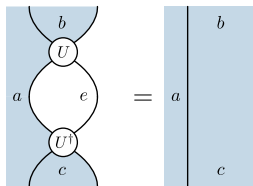
- **Vertical unitarity** determines the properties of the rows



$$\sum_e (U_{a,e})^\dagger_b (U_{a,e})_c = \delta_{bc}, \quad \forall a$$

$$\sum_e |U_{a,e}\rangle \langle U_{a,e}| = \mathbb{1}$$

Completeness



$$\sum_e (U_{a,b})^\dagger_e (U_{a,c})_e = \delta_{bc}, \quad \forall a$$

$$\langle U_{a,b} | U_{a,c} \rangle = \delta_{bc}$$

Orthonormality

- **Horizontal unitarity** fixes same property for the columns