

6. Axioms of quantum theory (Chapter II, pg 934 mixed version)

- States are linear operators ρ with

$$\rho \geq 0$$

$$\text{tr}(\rho) = 1.$$

- Evolutions are completely positive trace preserving (CPTP) maps

$$\mathcal{E}(\rho) = \sum \Pi_n \rho \Pi_n^\dagger, \quad \sum \Pi_n^\dagger \Pi_n = \mathbb{I}.$$

- Measurements act as

$$\rho \mapsto \rho_n = \frac{\Pi_n \rho \Pi_n^\dagger}{\text{tr}(\Pi_n \rho \Pi_n^\dagger)},$$

with probability $p_n = \text{tr}(\Pi_n^\dagger \Pi_n \rho)$,

where $\sum \Pi_n^\dagger \Pi_n = \mathbb{I}$.