

Fidelity **measures the quality** of the output state.

$F(\rho, |\psi\rangle) = 0$       completely wrong output

$F(\rho, |\psi\rangle) = 1$       output is the desired state

Fidelity is the probability of the output state passing a test for **being the same** as the input state.

Protocols often have a **requirement** on fidelity:

$$F(\rho, |\psi\rangle) > F_{crit}$$

- Entanglement purification in quantum networks
- Fault-tolerance in quantum computation