

$$\left. \begin{array}{c} \hat{\rho}_A \text{ --- } \boxed{\hat{U}_A} \text{ ---} \\ \hat{\rho}_B \text{ --- } \boxed{\hat{U}_B} \text{ ---} \end{array} \right\} \hat{\rho}' \iff \hat{\rho}' = (\hat{U}_A \otimes \hat{U}_B)(\hat{\rho}_A \otimes \hat{\rho}_B)(\hat{U}_A \otimes \hat{U}_B)^\dagger \\
 = \hat{U}_A \hat{\rho}_A \hat{U}_A^\dagger \otimes \hat{U}_B \hat{\rho}_B \hat{U}_B^\dagger$$