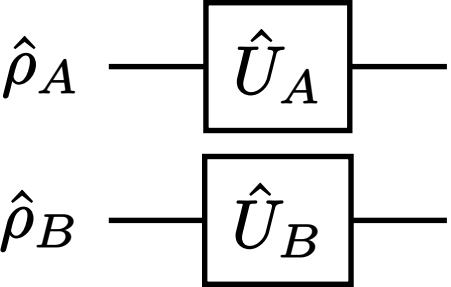

$$\iff \quad \hat{\rho}' = (\hat{U}_A \otimes \hat{U}_B)(\hat{\rho}_A \otimes \hat{\rho}_B)(\hat{U}_A \otimes \hat{U}_B)^\dagger$$
$$= \hat{U}_A \hat{\rho}_A \hat{U}_A^\dagger \otimes \hat{U}_B \hat{\rho}_B \hat{U}_B^\dagger$$