

$$\text{Wigner function } \mathcal{W}^* \underbrace{\phi \mathbf{z} \psi^*}_{\in \mathbb{R}^n \times_n \mathbb{R}} \in \mathbb{R}^n \times_n \mathbb{R} \begin{smallmatrix} \nearrow \\ \infty \end{smallmatrix} \mathbb{C}$$

$$\underbrace{\psi^* \phi}_{|F} = \int_{dy} \int_{d\eta}^{\mathbb{R}^n \times_n \mathbb{R}} F_{y|\eta} \underbrace{\phi^* \psi}_{y|\eta} = \phi | \underbrace{\mathcal{W}(F) \psi}_{y|\eta} = \text{tr } \mathcal{W}(F) \underbrace{\phi^* \psi}_{y|\eta}^* = \underbrace{\phi^* \psi}_{|F} | \mathcal{W}(F) = \overline{\mathcal{W}^* \phi \psi^*}_{|F}$$

$$\underbrace{\mathcal{W}^* \phi \mathbf{z} \psi^*}_{x|\xi} = \int_{dt}^{\mathbb{R}^n} x^{-t} \phi^{x+t} \overline{\psi} \mathfrak{e}^{2it|\xi}$$