

$$\int f = \int_{du}^{S_\ell} \int_{d_u^0(x)}^{\Omega_u} {}^x \mathcal{L}_u {}^x f$$

$$\phi \overline{\mathfrak{X}} \underline{w|u} \psi = \int_{du}^{S_\ell} \int_{d_u^0(x)}^{\Omega_u} {}^x \mathcal{L}_u {}^{x\bar{}} \phi {}^x \psi \underline{w|u}$$

$$\phi \overline{\mathfrak{X}} \frac{{}^x \underline{\mathcal{L}}_u}{{}^x \mathcal{L}_u} x \overset{*}{\underline{u}} w_1 \psi = \int_{du}^{S_\ell} \int_{d_u^0(x)}^{\Omega_u} {}^{x\bar{}} \phi {}^x \psi {}^x \underline{\mathcal{L}}_u x \overset{*}{\underline{u}} w_1$$