

fields $\mathbb{R}^d \xrightarrow{\mathcal{F}_a^i} \mathbb{R}$

$$\boxed{\mathcal{F}_a^i} = \boxed{x \mathcal{F}_a^i x} = x \left\{ \begin{array}{l} x \mathcal{F}_a^i \\ x \mathcal{F}_a^i \end{array} \right.$$

$$\boxed{\mathcal{F}_a^i} = \boxed{x \mathcal{F}_a^i x} = x \left\{ \begin{array}{l} x \mathcal{F}_a^i \\ x \mathcal{F}_a^i \end{array} \right.$$

$$\boxed{\mathcal{F}_a^i}^\mu = \boxed{x \mathcal{F}_a^i x}^\mu = x \left\{ \begin{array}{l} x \mathcal{F}_a^i \\ x \mathcal{F}_a^i \end{array} \right.^\mu = x \left[\begin{array}{l} x \mathcal{F}_a^i \\ x \mathcal{F}_a^i \end{array} \right]^\mu$$

$$\boxed{\mathcal{F}_a^i} \stackrel{\text{motion}}{=} \boxed{\mathcal{F}_a^i}^\mu$$

$$\left\{ \begin{array}{l} \mathcal{F}_a^i \\ \mathcal{F}_a^i \end{array} \right. = \left\{ \begin{array}{l} \mathcal{F}_a^i \\ \mathcal{F}_a^i \end{array} \right.^\mu$$

$$\mathcal{F}_a^i \in \mathbb{R}^d \underset{\infty}{\mathbb{R}} \text{ vanish at } \infty \Rightarrow \int_{dx} x \mathcal{F}_a^i x = - \int_{dx} x \mathcal{F}_a^i x$$

$$\mathcal{F}_a^i x \mathcal{L} = x \mathcal{F}_a^i x \left\{ \begin{array}{l} x \mathcal{F}_a^i \\ x \mathcal{F}_a^i \end{array} \right. + x \mathcal{F}_a^i x \left\{ \begin{array}{l} x \mathcal{F}_a^i \\ x \mathcal{F}_a^i \end{array} \right.^\mu = x \mathcal{F}_a^i x \boxed{\mathcal{F}_a^i} + x \mathcal{F}_a^i x \boxed{\mathcal{F}_a^i}^\mu \Rightarrow$$

$$\mathcal{F}_a^i \int_{dx} x \mathcal{L} = \int_{dx} \mathcal{F}_a^i x \mathcal{L} = \int_{dx} x \mathcal{F}_a^i x \boxed{\mathcal{F}_a^i} + x \mathcal{F}_a^i x \boxed{\mathcal{F}_a^i}^\mu = \int_{dx} x \mathcal{F}_a^i x \boxed{\mathcal{F}_a^i} - x \mathcal{F}_a^i x \boxed{\mathcal{F}_a^i}^\mu = \int_{dx} x \mathcal{F}_a^i x \overbrace{\left(\boxed{\mathcal{F}_a^i} - \boxed{\mathcal{F}_a^i}^\mu \right)}{=0}$$

$$\underbrace{\nu \delta^\mu \boxed{\mathcal{F}:} - \nu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^\mu}_{\mu} = \nu \boxed{\mathcal{F}:}$$

$$\boxed{\mathcal{F}:} = \nu \boxed{\mathcal{F}:} + \nu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^a + \nu \mu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^{\mu}$$

$$\Rightarrow \text{LHS} = \boxed{\mathcal{F}:} - \overbrace{\nu \mu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^\mu + \nu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^{\mu}}^{\mu \text{ terms}}$$

$$= \nu \boxed{\mathcal{F}:} + \nu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^a + \nu \mu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^\mu - \nu \mu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^\mu - \nu \mathcal{F}_{-a}^i \boxed{\mathcal{F}:}_i^{\mu*} = \nu \boxed{\mathcal{F}:}$$