5.2 Lorentz invariance of charge.

We choose n_μ as unit vector in time direction. With $\vartheta(n_\mu x^\mu) = \vartheta(t)$ and $\partial_i \vartheta(t) = 0$, we obtain

$$Q(t=0) = \int d^4x\, j^\mu(x) \partial_\mu \vartheta(n_\mu x^\mu) \tag{108}$$

$$= \int d^4x\, j^0(x) \partial_0 \vartheta(t) = \int d^4x\, j^0(x) \delta(t) = \int d^3x\, j^0(x)\,. \tag{109}$$

Since we started from a tensor equation, Q is Lorentz invariant.