E_{tot} is conserved but not invariant. What does that mean?

A. It's the same at any time in every reference frame.
B. It's the same at a given time in every reference frame.
C. It's the same at any time in a given reference frame.
D. Something else

m is invariant but not conserved. What does that mean?

A. It's the same at any time in every reference frame.
B. It's the same at a given time in every reference frame.
C. It's the same at any time in a given reference frame.
D. Something else

Charge is invariant and conserved. What does that mean?

A. It's the same at any time in every reference frame.
B. It's the same at a given time in every reference frame.
C. It's the same at any time in a given reference frame.
D. Something else

Do you see a problem do you see with $\mathbf{F} = \dfrac{d\mathbf{p}}{dt}$ with regard to relativity? We still define $\mathbf{p} \equiv \gamma m \mathbf{v}$.

A. There's no problem at all
B. Yup there's a problem, and I know what it is.
C. There's probably a problem, but I don't know what it is.

Can we define a 4-force via the 4-momentum?

$$\frac{dp^{\mu}}{d\tau} = K^{\mu}$$

Is K^{μ}, so defined, a 4-vector?

A. Yes, and I can say why.
B. No, and I can say why.
C. None of the above.

To match the behavior of non-relativistic classical mechanics, we might tentatively assign which of the following values to $\mathbf{K} = K^{1,2,3}$:

A. $\mathbf{K} = \mathbf{F}$
B. $\mathbf{K} = \mathbf{F}/\gamma$
C. $\mathbf{K} = \gamma\mathbf{F}$
D. Something else

A charge q is moving with velocity $\mathbf{u}$ in a uniform magnetic field $\mathbf{B}$.

$$\mathbf{F} = q\mathbf{u} \times \mathbf{B} = m\mathbf{a}$$

If we switch to a different Galilean frame (a low speed Lorentz transform), is the acceleration $\mathbf{a}$ different?

A. Yes
B. No

A charge q is moving with velocity $\mathbf{u}$ in a uniform magnetic field $\mathbf{B}$.

$$\mathbf{F} = q\mathbf{u} \times \mathbf{B} = m\mathbf{a}$$

If we switch to a different Galilean frame (a low speed Lorentz transform), is the particle velocity $\mathbf{u}$ different?

A. Yes
B. No

A charge q is moving with velocity $\mathbf{u}$ in a uniform magnetic field $\mathbf{B}$.

$$\mathbf{F} = q\mathbf{u} \times \mathbf{B} = m\mathbf{a}$$

If we switch to a different Galilean frame (a low speed Lorentz transform), is the magnetic field $\mathbf{B}$ different?

A. Yes

B. No

A charge q is moving with velocity $\mathbf{u}$ in a uniform magnetic field $\mathbf{B}$.

$$\mathbf{F} = q\mathbf{u} \times \mathbf{B} = m\mathbf{a}$$

Suppose we switch to frame with $\mathbf{v} = \mathbf{u}$, so that in the primed frame, $\mathbf{u}' = 0$ (the particle is instantaneously at rest). Does the particle feel a force from an E-field in this frame?

A. Yes
B. No
C. depends on details