Some Fundamental Facts

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ABSTRACT: One has discussed once more the dependence of mass upon velocity in Special Relativity and one has stated again that in the case of complex mass there must be $v > c$ or v totally complex. Moreover, one has noticed that charge can be described by generalized quaternions. The thesis has been postulated that the mass-charge space really exists. The spiral points have been interpreted as the solution of the equation $\frac{\partial^2 \psi}{\partial \varphi^2} = k$ appearing in different Laplacians. At the end the arguments have been presented that the physical reality is both quantum and classical.

1.
Let's take:

$$p = m v$$

$$m = i|m|$$

then:

$$p = i\ |m|\, v = |m|\,(iv) = |m|\, v'$$

Next:

$$v' = \frac{x}{t} = \frac{\dfrac{x' - vt'}{\sqrt{1 - \frac{v^2}{c^2}}}}{\dfrac{t' - \frac{vx'}{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}}} = \frac{x' - vt'}{t' - \frac{vx'}{c^2}}$$

$v = v'i$ and

$$v' = \frac{x' - vit'}{t' - \frac{vix'}{c^2}} \qquad (1)$$

So $\sqrt{1-\frac{v\prime^2}{c^2}}$ is a totally complex number even if $m = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$ is multiplicated by i (then we have im and im_0).

We can transform (1) into:

$$\frac{-v^2 ix'}{c^2} + 2ivt - x' = 0$$

$$\Delta = -4t^2 - \frac{4ix'^2}{c^2}$$

This equation hasn't solution in real numbers as far as v is concerned. So v must be totally complex and the condition $Re\, v = 0$ was eliminated.
Next, the equation (1) implicates that v is totally real, so we have discrepancy.
The case of m purely complex appears only when $v \in R$ and $v > c$.
But we can multiply by (-1) both members of the equation (1) and an effect is the same if we take the negative root of $\sqrt{1-\frac{v^2}{c^2}}$.
Moreover, [1]:

$$m = \alpha\, |Q|$$

here $m < 0$ and $\alpha > 0$.

It may be:
$m^2 = \alpha^2\, |Q|^2$ and $|Q|^2 < 0$
It implicates m complex too, and then Q would be generalized quaternion with corresponding parameters.

2.
The problem appears how one should understand the mass-charge space and what its relations to the "usual" space-time are.
The mass-charge space is a really existing space and not only in the world of ideas. It is a space, which is – in a certain sense – dual to the Minkovski or Riemann space.
The fact that both the mass and the space-time coordinates depend on velocity by the Lorentz transformation is the proof for this duality.

3.
Renormalizability arguments force us to include additional special points, like "spiral points" [2]. We can obtain them from the equation:

$$\frac{\partial^2 \psi}{\partial \varphi^2} = 0$$

$$\psi = \alpha\varphi + \varphi_0$$

and we have the spiral.
Or otherwise:

$$\frac{\partial \psi}{\partial \varphi} = \alpha$$

$$\psi = \alpha\varphi + \varphi_0$$

The fact that the same qualities (as the momentum or the vector potential for example) are both notions of mechanics or classical electrodynamics and operators in quantum mechanics, testifies to that the reality has both classical and quantum character.
Moreover, the facts that quantum mechanics arises from classical mechanics and the wave-particle dualism are the proofs for the above statement.
Both these facts are implicated by the identical mathematical shape of variational principles:

$$\delta \int \sqrt{E - V} \; d\tau = 0$$

for a particle,

and

$$\delta \int n \; ds = 0$$

for light.

References:

[1] Z. Morawski, "Attempt at Unification of Interactions and Quantization of Gravitation", this website
[2] O. Ganor, J. Sonnenschein, S. Yankielowicz, Nuclear Physics B 427 (1994), p. 203-244