Time and Space Reversal Problems In Armenian Theory of Relativity ©

(One Dimensional Space)

Armenian Theory of Asymmetric Relativity ©

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Abstract

In this current article we are analyzing in detail, T-symmetry (time reversal transformation) and P-symmetry (spatial inverse transformations) phenomenons in Armenian Theory of Relativity in one dimensional physical space. For that purpose we are referring and using our previous articles results, especially in the case of research mirror reflection phenomena (spatial inversion) where we are mostly referring to our main research article, published in Armenia on June 2013 (96 pages).

We are delighted to know that Armenian Theory of Relativity has passed the first phase of total ridicule and now is in the phase of active discussion in scientific communities across the world. This article can be considered as an answer to the physicists who criticize the Armenian Theory of Relativity by saying that the Armenian relativistic transformations and formulas are not an invariant under time-reversal transformation and therefore Armenian Theory of Relativity is wrong.

In the first section of our article we are showing that in the case of time-reversal, Armenian Theory of Relativity is in full agreement with legacy physics and therefore our opponents criticisms in that matter are baseless.

In the case of spatial inversion (in our case mirror reflection) Armenian Theory of Special Relativity does not contradict in quality with legacy physics, but gives a more detailed and fine description of that phenomena, which in the macro-world is mostly unobservable but plays a very significant role in the micro-world.

Our received results can explain many parity irregularities in elementary particle physics, especially the violation parity process in weak interactions.

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Introduction

Scientists examine symmetry properties of the Universe to solve problems and to search for new understandings of the physical laws governing the behavior of matter of the world around us (both macro and micro). That is what we have done in our new Armenian Theory of Relativity, where we are exploring totally new uncharted territory.

If we like to effectively present our article and explain only time-reversal phenomena or only space-reversal phenomena or both: time-reversal and space-reversal phenomenons together, then we really need to understand the physical meanings of these two different phenomenons. It is worth to mention that the one dimensional space-reversal phenomena is equivalent to the mirror reflection phenomena, which is the main content of our article.

Time-reversal phenomena has many philosophical complexities such as time travel and so on, but its physical meaning is a very simple mathematical action which leaves the physical formula unchanged or negates the formula. We also need to mention that all fundamental physical quantities, which are not derived from time stays unchanged, such as test particle spatial coordinates $(x \to x)$, masses $(m \to m)$ and charges $(q \to q)$. Therefore in all legacy physics formulas, besides for negating time and keeping the test particle spatial coordinates, masses and charges unchanged, we also need to negate the physical quantities, which have been derived by odd order derivation of spatial coordinates by time. For example we need to negate the sign of all velocities $(u \to -u)$. On the contrary, if physical quantities which have been derived by even order derivation of spatial coordinates by time, then those must stay unchanged such as the test particle acceleration $(a \to a)$.

Spatial coordinates inversion, which in our article means mirror reflection action about X axis, is surprisingly becoming a more complex physical phenomena than time-reversal phenomena. If we like to fully understand parity-reversal phenomena physical meanings and describe it mathematically, we need to define the idea of opposite inertial systems. Afterward all Armenian relativistic formulas need to be rewritten according to the new defined direct and opposite inertial systems and then find relation between those two type of quantities and formulas.

First we will investigate in detail the time-reversal phenomena case and then shift all our attention to spatial-inversion (mirror-reflection) phenomena in Armenian Theory of Special Relativity.

Contrary to Lorentz theory of relativity, Armenian Theory of Relativity is more rich because of two new time-space characterizing coefficients s and g. Therefore, except for the above mentioned concern, in time-reversal and mirror-reflection cases, we also need to simultaneously make the following changes.

a) *In the time-reversal case in Armenian Theory of Relativity we need to also negate the sign of coefficient s and leave the sign of coefficient of g unchanged. So we need to make the following substitutions: $(s \to -s)$ and $(g \to g)$.*

b) *In the mirror-reflection case in Armenian Theory of Relativity we need to leave both s and g time-space constants unchanged: $(s \to s)$ and $(g \to g)$.*

We also like to emphasize that we did not denote coefficient s that letter by accident, but we denote it by design, because it is the spin-like quantity in Macro World, which will be represented as a real vector in the three dimensional world. But in the Micro World that coefficient s in reality represents the spin of the test particle. We like to remind you also that in quantum mechanics, in the case of time-reversal, the spin sign is negated and in case of mirror reflection the spin sign is left unchanged. Therefore we can conclude that everything is in complete harmony with legacy physics.

It is worth to mention again that all legacy physics (classical and relativistic) transformations and formulas can be obtained from Armenian Theory of Relativity as a particular case by substituting $s = 0$ and $g = -1$.

In the end we like to make a statement that: Armenian Theory of Relativity is a Theory of Asymmetric Relativity.

1 - Only Time Reversal Phenomena Consideration

First lets write down all quantities of legacy mechanics, which in the case of time-reversal, their sign either stays invariant or is negated. Those physical quantities are listed below.

- *The signs of the following physical quantities of legacy mechanics stays invariant*

$$\begin{cases} \text{The mass of the test particle} & - \quad m \to m \\ \text{The position of the test particle} & - \quad \vec{r} \to \vec{r} \\ \text{The acceleration of the test particle} & - \quad \vec{a} \to \vec{a} \\ \text{The energy of the test particle} & - \quad E \to E \\ \text{The force on the test particle} & - \quad \vec{F} \to \vec{F} \end{cases} \tag{1-01}$$

- *The signs of the following physical quantities of legacy mechanics are negated*

$$\begin{cases} \text{The time when an event occurs} & - \quad t \to -t \\ \text{The velocity of the test particle} & - \quad \vec{u} \to -\vec{u} \\ \text{The linear momentum of the test particle} & - \quad \vec{P} \to -\vec{P} \\ \text{The angular momentum of the test particle} & - \quad \vec{l} \to -\vec{l}^{\,*} \\ \text{The spin of the test particle} & - \quad \vec{s} \to -\vec{s} \end{cases} \tag{1-02}$$

* - In one dimensional space not exist angular momentum, therefore for now we don't discussed it.

Now we need to show that in one dimensional Armenian Theory of Relativity, in the case of time-reversal, all physical quantities properties given by the table $(1-01)$ and $(1-02)$ are conserved. For that purpose in all Armenian transformations equations and Armenian relativistic formulas we need to negate time $(t \to -t)$ and also need to make the following operations related with time-reversal.

$$\begin{cases} \text{We need to negate all velocities in all inertial systems} & - \quad u \to -u \\ \text{We need to keep the accelerations unchanged in all inertial systems} & - \quad a \to a \\ \text{We need to negate the new time-space constant } s \text{ in all inertial systems} & - \quad s \to -s \\ \text{We need to keep the new time-space constant } g \text{ unchanged in all inertial systems} & - \quad g \to g \end{cases} \tag{1-03}$$

Now using the time-reversal operation given by table $(1-03)$, we try to test, one by one, all transformations and relativistic formulas derived by Armenian Theory of Relativity.

- *In the case of time-reversal operation, reciprocal velocity formula stays invariant* $(1.7-10)^1$, $(5)^2$, $(14)^3$

$$(-v') = -\frac{(-v)}{1+(-s)\dfrac{(-v)}{c}} \qquad \Rightarrow \qquad v' = -\frac{v}{1+s\dfrac{v}{c}} \tag{1-04}$$

- *In the case of time-reversal operation, Armenian gamma function quantity stays invariant* $(6)^2$, $(16)^3$

$$\gamma_{\text{ꙁ}}(-v) = \frac{1}{\sqrt{1+(-s)\dfrac{(-v)}{c}+g\dfrac{(-v)^2}{c^2}}} = \frac{1}{\sqrt{1+s\dfrac{v}{c}+g\dfrac{v^2}{c^2}}} = \gamma_{\text{ꙁ}}(v) \tag{1-05}$$

◆ *In the case of time-reversal operation, Armenian time-space interval* <u>*stays invariant*</u> $(8)^2$, $(18)^3$

$$\text{մ}^2(-t,x) = (-ct)^2 + (-s)(-ct)x + gx^2 = (ct)^2 + s(ct)x + gx^2 = \text{մ}^2(t,x) \tag{1-06}$$

◆ *In the case of time-reversal operation, the mathematical form of the time-space coordinates Armenian transformation equations* <u>*stays invariant*</u> $(4)^2$, $(07)^3$

$$\begin{cases} (-t') = \gamma_{\text{չ}}(-v)\left\{\left[1 + (-s)\dfrac{(-v)}{c}\right](-t) + g\dfrac{(-v)}{c^2}x\right\} \\ x' = \gamma_{\text{չ}}(-v)[x - (-v)(-t)] \end{cases} \Rightarrow \begin{cases} t' = \gamma_{\text{չ}}(v)\left[\left(1 + s\dfrac{v}{c}\right)t + g\dfrac{v}{c^2}x\right] \\ x' = \gamma_{\text{չ}}(v)(x - vt) \end{cases} \tag{1-07}$$

◆ *In the case of time-reversal operation, addition and subtraction formulas of velocities* <u>*stays invariant*</u> $(10)^2$, $(19,20)^3$

$$\begin{cases} (-u) = \dfrac{(-u') + (-v) + (-s)\dfrac{(-v)(-u')}{c}}{1 - g\dfrac{(-v)(-u')}{c^2}} \\ (-u') = \dfrac{(-u) - (-v)}{1 + (-s)\dfrac{(-v)}{c} + g\dfrac{(-v)(-u)}{c^2}} \end{cases} \Rightarrow \begin{cases} u = \dfrac{u' + v + s\dfrac{vu'}{c}}{1 - g\dfrac{vu'}{c^2}} \\ u' = \dfrac{u - v}{1 + s\dfrac{v}{c} + g\dfrac{vu}{c^2}} \end{cases} \tag{1-08}$$

◆ *In the case of time-reversal operation, Armenian Lagrangian formula* <u>*stays invariant*</u> $(18)^2$, $(28)^3$

$$\mathcal{L}_{\text{չ}}(-u) = -m_0c^2\sqrt{1 + (-s)\frac{(-u)}{c} + g\frac{(-u)^2}{c^2}} = -m_0c^2\sqrt{1 + s\frac{u}{c} + g\frac{u^2}{c^2}} = \mathcal{L}_{\text{չ}}(u) \tag{1-09}$$

◆ *In the case of time-reversal operation, Armenian Lagrangian function transformations* <u>*stays invariant*</u> $(30)^3$

$$\begin{cases} \mathcal{L}_{\text{չ}}(-u') = \dfrac{\sqrt{1 + (-s)\dfrac{(-v)}{c} + g\dfrac{(-v)^2}{c^2}}}{1 + (-s)\dfrac{(-v)}{c} + g\dfrac{(-v)(-u)}{c^2}}\mathcal{L}_{\text{չ}}(-u) \\ \mathcal{L}_{\text{չ}}(-u) = \dfrac{\sqrt{1 + (-s)\dfrac{(-v)}{c} + g\dfrac{(-v)^2}{c^2}}}{1 - g\dfrac{(-v)(-u')}{c^2}}\mathcal{L}_{\text{չ}}(-u') \end{cases} \Rightarrow \begin{cases} \mathcal{L}_{\text{չ}}(u') = \dfrac{\sqrt{1 + s\dfrac{v}{c} + g\dfrac{v^2}{c^2}}}{1 + s\dfrac{v}{c} + g\dfrac{vu}{c^2}}\mathcal{L}_{\text{չ}}(u) \\ \mathcal{L}_{\text{չ}}(u) = \dfrac{\sqrt{1 + s\dfrac{v}{c} + g\dfrac{v^2}{c^2}}}{1 - g\dfrac{vu'}{c^2}}\mathcal{L}_{\text{չ}}(u') \end{cases} \tag{1-10}$$

◆ *In the case of time-reversal operation, Armenian energy quantity* <u>*stays invariant*</u> $(19)^2$, $(31)^3$

$$E_{\text{չ}}(-u) = \gamma_{\text{չ}}(-u)\left[1 + \frac{1}{2}(-s)\frac{(-u)}{c}\right]m_0c^2 = \gamma_{\text{չ}}(u)\left(1 + \tfrac{1}{2}s\frac{u}{c}\right)m_0c^2 = E_{\text{չ}}(u) \tag{1-11}$$

◆ *In the case of time-reversal operation, the sign of the Armenian linear momentum formula is* <u>*negated*</u> $(19)^2$, $(31)^3$

$$P_{\text{չ}}(-u) = -\gamma_{\text{չ}}(-u)\left[\frac{1}{2}(-s) + g\frac{(-u)}{c}\right]m_0c = +\gamma_{\text{չ}}(u)\left(\tfrac{1}{2}s + g\frac{u}{c}\right)m_0c = -P_{\text{չ}}(u) \tag{1-12}$$

- *In the case of time-reversal operation, relation between Armenian energy and Armenian linear momentum stays invariant* $(25)^2$, $(34)^3$

$$c^2P_{\text{չ}}^2(-u)+(-s)cP_{\text{չ}}(-u)E_{\text{չ}}(-u)+gE_{\text{չ}}^2(-u)=\left[g-\tfrac{1}{4}(-s)^2\right](m_0c^2)^2 \qquad \Rightarrow$$

$$\Rightarrow \qquad c^2P_{\text{չ}}^2(u)+scP_{\text{չ}}(u)E_{\text{չ}}(u)+gE_{\text{չ}}^2(u)=(g-\tfrac{1}{4}s^2)(m_0c^2)^2 \tag{1-13}$$

- *In the case of time-reversal operation, Armenian energy-momentum transformation equations stays invariant* $(24)^2$, $(32,33)^3$

$$\begin{cases} E_{\text{չ}}(-u')=\gamma_{\text{չ}}(-v)\left[E_{\text{չ}}(-u)-(-v)P_{\text{չ}}(-u)\right] \\ P_{\text{չ}}(-u')=\gamma_{\text{չ}}(-v)\left\{\left[1+(-s)\dfrac{(-v)}{c}\right]P_{\text{չ}}(-u)+g\dfrac{(-v)}{c^2}E_{\text{չ}}(-u)\right\} \end{cases} \qquad \Rightarrow$$

$$\Rightarrow \qquad \begin{cases} E_{\text{չ}}(u')=\gamma_{\text{չ}}(v)\left[E_{\text{չ}}(u)-vP_{\text{չ}}(u)\right] \\ P_{\text{չ}}(u')=\gamma_{\text{չ}}(v)\left[\left(1+s\dfrac{v}{c}\right)P_{\text{չ}}(u)+g\dfrac{v}{c^2}E_{\text{չ}}(u)\right] \end{cases} \tag{1-14}$$

- *In the case of time-reversal operation, Armenian spatial (Newtonian) force derivation formula stays invariant* $(\text{չ}2-35)^1$

$$F_{\text{չ}}(-u)=\frac{dP_{\text{չ}}(-u)}{d(-t)}=\frac{-dP_{\text{չ}}(u)}{-dt}=\frac{dP_{\text{չ}}(u)}{dt}=F_{\text{չ}}(u) \tag{1-15}$$

- *In the case of time-reversal operation, Armenian spatial (Newtonian) force quantity stays invariant* $(\text{չ}2-37)^1$, $(45)^3$

$$F_{\text{չ}}(-u)=-\left[g-\tfrac{1}{4}(-s)^2\right]m_0\gamma_{\text{չ}}^3(-u)a=-(g-\tfrac{1}{4}s^2)m_0\gamma_{\text{չ}}^3(u)a=F_{\text{չ}}(u) \tag{1-16}$$

- *In the case of time-reversal operation, the sign of the scalar component of the Armenian force derivation formula is negated* $(\text{չ}2-36)^1$

$$F_{\text{չ}}^0(-u)=\frac{1}{c}\frac{dE_{\text{չ}}(-u)}{d(-t)}=\frac{1}{c}\frac{dE_{\text{չ}}(u)}{-dt}=-\frac{1}{c}\frac{dE_{\text{չ}}(u)}{dt}=-F_{\text{չ}}^0(u) \tag{1-17}$$

- *In the case of time-reversal operation, the sign of the scalar component of the Armenian force quantity is negated* $(\text{չ}2-38)^1$

$$F_{\text{չ}}^0(-u)=-\left[g-\frac{1}{4}(-s)^2\right]m_0\frac{(-u)}{c}\gamma^3(-u)a=+\left(g-\frac{1}{4}s^2\right)m_0\frac{u}{c}\gamma^3(u)a=-F_{\text{չ}}^0(u) \tag{1-18}$$

Remark 1 - *Dear readers, if we missed any transformation equations or any relativistic formulas, we hope that you can easily use* $(1-03)$ *and make the time-reversal operation, to prove that particular formula stays invariant or has the sign negated.*

2 - Definition of Opposite Inertial Systems and Only Space Reversal Phenomena Consideration

Now again lets write down all quantities of legacy mechanics, which in the case of spatial-inversion (in our article mirror reflection about X axis) it either stays invariant or has its sign changed. Below you can see those physical quantities.

- *The following physical quantities of legacy mechanics stays invariant*

$$\begin{cases} \text{The time when an event occurs} & - \quad t \rightarrow t \\ \text{The mass of the test particle} & - \quad m \rightarrow m \\ \text{The energy of the test particle} & - \quad E \rightarrow E \\ \text{The angular momentum of the test particle} & - \quad \vec{l} \rightarrow \vec{l}^{\,*} \\ \text{The spin of the test particle} & - \quad \vec{s} \rightarrow \vec{s} \end{cases} \tag{2-01}$$

* - In one dimensional space not exist angular momentum, therefore for now we don't discussed it.

- *The following physical quantities of legacy mechanics have their signs negated*

$$\begin{cases} \text{The position of the test particle} & - \quad \vec{r} \rightarrow -\vec{r} \\ \text{The velocity of the test particle} & - \quad \vec{u} \rightarrow -\vec{u} \\ \text{The acceleration of the test particle} & - \quad \vec{a} \rightarrow -\vec{a} \\ \text{The linear momentum of the test particle} & - \quad \vec{P} \rightarrow -\vec{P} \\ \text{The force on the test particle} & - \quad \vec{F} \rightarrow -\vec{F} \end{cases} \tag{2-02}$$

In the case of space reversal, Armenian transformation equations and formulas in general do not contradict the physical quantity properties of legacy mechanics given by table $(2-01)$ and $(2-02)$. However Armenian relativistic formulas gives a more detailed and fine description of that phenomena, which in the macro-world is mostly unobservable but it plays a very significant role in the micro-world.

Now if we like to test all Armenian transformation equations and relativistic formulas for this space-reversal case, we first need to define the idea of opposite inertial systems and accordingly use this new notations for all physical quantities. In doing so we can easily distinguish whether those are located in the direct (not reversal) World or are located in the opposite (in reversal) World.

Lets assume we are given inertial system K, which we can conventionally call the direct inertial system. Now on the origin of that inertial system, we place a two sided mirror perpendicular to the X axis, which can simultaneously reflect positive and negative parts of the axis. This means that the positive axis of the direct inertial system K becomes a negative axis and the negative axis becomes a positive axis. This newly received inertial system becomes the total inversion of the given inertial system K, which we call the opposite inertial system. Then to distinguish between these two inertial systems: direct inertial system and opposite inertial system, in Armenian Theory of Relativity, we use the following notations $(1.8-2)$[1]:

$$\begin{cases} \text{For direct inertial system } K & \rightarrow \quad \overrightarrow{K} \\ \text{For opposite inertial system } K & \rightarrow \quad \overleftarrow{K} \end{cases} \tag{2-03}$$

In order to be able to distinguish between all physical quantities for moving test particles in the direct inertial system $\overrightarrow{K}$ and in the opposite inertial system $\overleftarrow{K}$, we need to implement the following notations.

- *In Armenian Kinematics* $(1.8-3,4)$[1]

In the $\vec{K}$ direct inertial system ⟺ In the $\overleftarrow{K}$ opposite inertial system

$$\begin{cases} \text{For time} & \rightarrow & \vec{t} \\ \text{For spatial position} & \rightarrow & \vec{x} \\ \text{For velocity} & \rightarrow & \vec{u}=\dfrac{d\vec{x}}{d\vec{t}} \\ \text{For acceleration} & \rightarrow & \vec{a}=\dfrac{d\vec{u}}{d\vec{t}} \\ \text{For Armenian interval} & \rightarrow & \vec{\text{Ե}} \end{cases} \Leftrightarrow \begin{cases} \text{For time} & \rightarrow & \overleftarrow{t} \\ \text{For spatial position} & \rightarrow & \overleftarrow{x} \\ \text{For velocity} & \rightarrow & \overleftarrow{u}=\dfrac{d\overleftarrow{x}}{d\overleftarrow{t}} \\ \text{For acceleration} & \rightarrow & \overleftarrow{a}=\dfrac{d\overleftarrow{u}}{d\overleftarrow{t}} \\ \text{For Armenian interval} & \rightarrow & \overleftarrow{\text{Ե}} \end{cases} \qquad (2\text{-}04)$$

- *In Armenian Dynamics* $(\text{չ}2)$[1]

In the $\vec{K}$ direct inertial system ⟺ In the $\overleftarrow{K}$ opposite inertial system

$$\begin{cases} \text{For action integral} & \rightarrow & \vec{\text{Ե}}_{\text{չ}} \\ \text{For Armenian Lagrangian} & \rightarrow & \vec{\mathcal{L}}_{\text{չ}}=\mathcal{L}_{\text{չ}}(\vec{u}) \\ \text{For Armenian energy} & \rightarrow & \vec{E}_{\text{չ}}=E_{\text{չ}}(\vec{u}) \\ \text{For Armenian momentum} & \rightarrow & \vec{P}_{\text{չ}}=P_{\text{չ}}(\vec{u}) \\ \text{For Armenian spatial force} & \rightarrow & \vec{F}_{\text{չ}}=\dfrac{d\vec{P}_{\text{չ}}}{d\vec{t}} \\ \text{For Armenian scalar force} & \rightarrow & \vec{F}^{0}_{\text{չ}}=\dfrac{d\vec{E}_{\text{չ}}}{d\vec{t}} \end{cases} \Leftrightarrow \begin{cases} \text{For action integral} & \rightarrow & \overleftarrow{\text{Ե}}_{\text{չ}} \\ \text{For Armenian Lagrangian} & \rightarrow & \overleftarrow{\mathcal{L}}_{\text{չ}}=\mathcal{L}_{\text{չ}}(\overleftarrow{u}) \\ \text{For Armenian energy} & \rightarrow & \overleftarrow{E}_{\text{չ}}=E_{\text{չ}}(\overleftarrow{u}) \\ \text{For Armenian momentum} & \rightarrow & \overleftarrow{P}_{\text{չ}}=P_{\text{չ}}(\overleftarrow{u}) \\ \text{For Armenian spatial force} & \rightarrow & \overleftarrow{F}_{\text{չ}}=\dfrac{d\overleftarrow{P}_{\text{չ}}}{d\overleftarrow{t}} \\ \text{For Armenian scalar force} & \rightarrow & \overleftarrow{F}^{0}_{\text{չ}}=\dfrac{d\overleftarrow{E}_{\text{չ}}}{d\overleftarrow{t}} \end{cases} \qquad (2\text{-}05)$$

In a similar way for some other K' inertial system we can define direct and opposite inertial systems as well and use the following notations $(1.8-2)$[1]:

$$\begin{cases} \text{For direct inertial system } K' & \rightarrow & \vec{K}' \\ \text{For opposite inertial system } K' & \rightarrow & \overleftarrow{K}' \end{cases} \qquad (2\text{-}06)$$

As before, in order to distinguish between all physical quantities for the same moving test particle in the direct inertial system $\vec{K}'$ and in the opposite inertial system $\overleftarrow{K}'$, we need to use the following notations similar to $(2-04)$ and $(2-05)$.

- *In Armenian Kinematics* $(1.8-3,4)$[1]

In the $\vec{K}'$ direct inertial system ⟺ In the $\overleftarrow{K}'$ opposite inertial system

$$\begin{cases} \text{For time} & \rightarrow & \vec{t}' \\ \text{For spatial position} & \rightarrow & \vec{x}' \\ \text{For velocity} & \rightarrow & \vec{u}'=\dfrac{d\vec{x}'}{d\vec{t}'} \\ \text{For acceleration} & \rightarrow & \vec{a}'=\dfrac{d\vec{u}'}{d\vec{t}'} \\ \text{For Armenian interval} & \rightarrow & \vec{\text{Ե}}' \end{cases} \Leftrightarrow \begin{cases} \text{For time} & \rightarrow & \overleftarrow{t}' \\ \text{For spatial position} & \rightarrow & \overleftarrow{x}' \\ \text{For velocity} & \rightarrow & \overleftarrow{u}'=\dfrac{d\overleftarrow{x}'}{d\overleftarrow{t}'} \\ \text{For acceleration} & \rightarrow & \overleftarrow{a}'=\dfrac{d\overleftarrow{u}'}{d\overleftarrow{t}'} \\ \text{For Armenian interval} & \rightarrow & \overleftarrow{\text{Ե}}' \end{cases} \qquad (2\text{-}07)$$

- *In Armenian Dynamics* $(\text{չ}2)$[1]

$$\underline{\text{In the } \overrightarrow{K}' \text{ direct inertial system}} \qquad\qquad \underline{\text{In the } \overleftarrow{K}' \text{ opposite inertial system}}$$

$$\left\{\begin{array}{lll} \text{For action integral} & \rightarrow & \overrightarrow{\text{Ե}}'_{\text{չ}} \\ \text{For Armenian Lagrangian} & \rightarrow & \overrightarrow{\mathcal{L}}'_{\text{չ}} = \mathcal{L}_{\text{չ}}\left(\overrightarrow{u}'\right) \\ \text{For Armenian energy} & \rightarrow & \overrightarrow{E}'_{\text{չ}} = E_{\text{չ}}\left(\overrightarrow{u}'\right) \\ \text{For Armenian momentum} & \rightarrow & \overrightarrow{P}'_{\text{չ}} = P_{\text{չ}}\left(\overrightarrow{u}'\right) \\ \text{For Armenian spatial force} & \rightarrow & \overrightarrow{F}'_{\text{չ}} = \dfrac{d\overrightarrow{P}'_{\text{չ}}}{d\overrightarrow{t}'} \\ \text{For Armenian scalar force} & \rightarrow & \overrightarrow{F}'^{0}_{\text{չ}} = \dfrac{d\overrightarrow{E}'_{\text{չ}}}{d\overrightarrow{t}'} \end{array}\right. \Leftrightarrow \left\{\begin{array}{lll} \text{For action integral} & \rightarrow & \overleftarrow{\text{Ե}}'_{\text{չ}} \\ \text{For Armenian Lagrangian} & \rightarrow & \overleftarrow{\mathcal{L}}'_{\text{չ}} = \mathcal{L}_{\text{չ}}\left(\overleftarrow{u}'\right) \\ \text{For Armenian energy} & \rightarrow & \overleftarrow{E}'_{\text{չ}} = E_{\text{չ}}\left(\overleftarrow{u}'\right) \\ \text{For Armenian momentum} & \rightarrow & \overleftarrow{P}'_{\text{չ}} = P_{\text{չ}}\left(\overleftarrow{u}'\right) \\ \text{For Armenian spatial force} & \rightarrow & \overleftarrow{F}'_{\text{չ}} = \dfrac{d\overleftarrow{P}'_{\text{չ}}}{d\overleftarrow{t}'} \\ \text{For Armenian scalar force} & \rightarrow & \overleftarrow{F}'^{0}_{\text{չ}} = \dfrac{d\overleftarrow{E}'_{\text{չ}}}{d\overleftarrow{t}'} \end{array}\right. \tag{2-08}$$

Moreover, if K' inertial system has a relative velocity v with respect to the inertial system K, then we call it direct relative velocity and accordingly we denote it as $\overrightarrow{v}$. Likewise if K inertial system has a relative velocity v' with respect to the inertial system K', which is physically the mirror reflected velocity of the direct relative velocity $\overrightarrow{v}$ and we naturally denote it as $\overleftarrow{v}$. Therefore for mutual relative velocities between K and K' inertial systems we use the following notations $(1.8-5)$[1]:

$$\left\{\begin{array}{lll} \text{For direct relative velocity} & \rightarrow & v = \overrightarrow{v} \\ \text{For reciprocal relative velocity} & \rightarrow & v' = \overleftarrow{v} \end{array}\right. \tag{2-09}$$

Since the reciprocal (inverse) velocity of the reciprocal relative velocity is exactly the same as the direct relative velocity, therefore we can record that physical fact in the usual way or by the way of vector sign notation (15)[3]:

$$\boxed{(v')' = v \qquad \text{or} \qquad \overleftarrow{\left(\overleftarrow{v}\right)} = \overrightarrow{v}} \tag{2-10}$$

<u>Remark 2</u> - *From the definition that the opposite inertial system is the full (left and right side) reflection of the direct inertial system, in legacy mechanics (classical and relativistic) it means that the physical quantities that have a direction have their signs reversed (except angular momentum and spin), while all scalar physical quantities do not change their sign* $(2-01,02)$. *Also, the absolute values of all the direct and reflected physical quantities (scalar or vector) are equal to each other. However that is not the case in Armenian Theory of Relativity, where for some physical quantities that is correct but for some other physical quantities (scalar or vector) that is incorrect. Below is a list (not full) of unchanged and changed physical quantities.*

- *The physical quantities, whose absolute values in Armenian Theory of Relativity in the case of mirror reflection <u>stays unchanged</u>*

$$\left\{\begin{array}{lll} \text{Position coordinates} & \rightarrow & \left|\overleftarrow{x}\right| = \left|\overrightarrow{x}\right| \\ \text{Armenian interval} & \rightarrow & \left|\overleftarrow{\text{ե}}\right| = \left|\overrightarrow{\text{ե}}\right| \\ \text{Least action integral} & \rightarrow & \left|\overleftarrow{\text{Ե}}_{\text{չ}}\right| = \left|\overrightarrow{\text{Ե}}_{\text{չ}}\right| \\ \text{Armenian energy} & \rightarrow & \left|\overleftarrow{E}_{\text{չ}}\right| = \left|\overrightarrow{E}_{\text{չ}}\right| \\ \text{Armenian spatial force} & \rightarrow & \left|\overleftarrow{F}_{\text{չ}}\right| = \left|\overrightarrow{F}_{\text{չ}}\right| \end{array}\right. \tag{2-11}$$

◆ *The physical quantities, whose absolute values in Armenian Theory of Relativity in the case of mirror reflection are changed*

$$\begin{cases} \text{Time interval of the event} & \rightarrow & \left|\overleftarrow{t}\right| \neq \left|\overrightarrow{t}\right| \\ \text{Movement velocities} & \rightarrow & \left|\overleftarrow{u}\right| \neq \left|\overrightarrow{u}\right| \\ \text{Movement accelerations} & \rightarrow & \left|\overleftarrow{a}\right| \neq \left|\overrightarrow{a}\right| \\ \text{Armenian Lagrangians} & \rightarrow & \left|\overleftarrow{\mathcal{L}}_{Հ}\right| \neq \left|\overrightarrow{\mathcal{L}}_{Հ}\right| \\ \text{Armenian linear momentums} & \rightarrow & \left|\overleftarrow{P}_{Հ}\right| \neq \left|\overrightarrow{P}_{Հ}\right| \\ \text{Armenian scalar force} & \rightarrow & \left|\overleftarrow{F}^{0}_{Հ}\right| \neq \left|\overrightarrow{F}^{0}_{Հ}\right| \end{cases} \tag{2-12}$$

Remark 3 - *The absolute value inequalities of direct and mirror reflected physical quantities, given by table* $(2-12)$, *is specific only for Armenian Theory of Special Relativity, whose results come as a complete surprise for legacy physics. These miraculous properties of physical quantities opens Pandora's box of the Universe and outlines a new horizon for future technology.*

As we have already mentioned in the introduction, the two new universal constants s and g in Armenian Theory of Relativity in the case of mirror reflection stays unchanged. But that is not enough, we also need to know how the fundamental physical quantities such as time, space, velocity and acceleration are changed in the case of P-symmetry (mirror reflection). Thanks to Armenian Theory of Relativity, we have a complete solution to all those questions.

In the case of only space reversal (in our article mirror reflection) the static time and space coordinates and their differentials Armenian transformation equations in the K and K' inertial systems have the following form.

◆ *In the case of mirror reflection Armenian transformations of the time-space coordinates in the K inertial system* $(1.8-15,17)$[1], (12)[2], (06)[3]

$$\begin{cases} c\overleftarrow{t} = c\overrightarrow{t} + s\overrightarrow{x} \\ \overleftarrow{x} = -\overrightarrow{x} \end{cases} \Leftrightarrow \begin{cases} c\overrightarrow{t} = c\overleftarrow{t} + s\overleftarrow{x} \\ \overrightarrow{x} = -\overleftarrow{x} \end{cases} \tag{2-13}$$

◆ *In the case of mirror reflection Armenian transformations of the time-space coordinates differentials in the K inertial system* $(1.8-16,18,19)$[1]

$$\begin{cases} d\overleftarrow{t} = \left(1 + s\dfrac{\overrightarrow{u}}{c}\right)d\overrightarrow{t} \\ d\overleftarrow{x} = -d\overrightarrow{x} \end{cases} \Leftrightarrow \begin{cases} d\overrightarrow{t} = \left(1 + s\dfrac{\overleftarrow{u}}{c}\right)d\overleftarrow{t} \\ d\overrightarrow{x} = -d\overleftarrow{x} \end{cases} \tag{2-14}$$

◆ *In the case of mirror reflection Armenian transformations of the time-space coordinates in the K' inertial system* $(1.8-15,17)$[1]

$$\begin{cases} c\overleftarrow{t}' = c\overrightarrow{t}' + s\overrightarrow{x}' \\ \overleftarrow{x}' = -\overrightarrow{x}' \end{cases} \Leftrightarrow \begin{cases} c\overrightarrow{t}' = c\overleftarrow{t}' + s\overleftarrow{x}' \\ \overrightarrow{x}' = -\overleftarrow{x}' \end{cases} \tag{2-15}$$

◆ *In the case of mirror reflection Armenian transformations of the time-space coordinates differentials in the K' inertial system* $(1.8-16,18,19)$[1]

$$\begin{cases} d\overleftarrow{t}' = \left(1 + s\dfrac{\overrightarrow{u}'}{c}\right)d\overrightarrow{t}' \\ d\overleftarrow{x}' = -d\overrightarrow{x}' \end{cases} \Leftrightarrow \begin{cases} d\overrightarrow{t}' = \left(1 + s\dfrac{\overleftarrow{u}'}{c}\right)d\overleftarrow{t}' \\ d\overrightarrow{x}' = -d\overleftarrow{x}' \end{cases} \tag{2-16}$$

Only in the case of mirror reflection, from moving test particle time-space coordinates differentials transformation equations, we can obtain the formula for the reflected opposite velocities in the K and K' inertial systems. For that purpose we need to use $(2-14)$ and $(2-16)$ system of the equations, dividing second equations by the first equations. Armenian reciprocal (reflected) velocity formula is completely different from the legacy physics corresponding reciprocal velocity formula $\left(\overleftarrow{u} = -\vec{u}\right)$. Moreover Armenian opposite velocity formulas is applicable for relative velocity and for the test particle arbitrary velocity as well.

- *Armenian formulas for direct and opposite (mirror reflected) velocities in the inertial systems K and K' have the following form, but their absolute values do not equal each other* $(1.8-6,8)$[1]

In the K inertial system — In the K' inertial system

$$\begin{cases} \overleftarrow{u} = -\dfrac{\vec{u}}{1+s\dfrac{\vec{u}}{c}} \\[2ex] \vec{u} = -\dfrac{\overleftarrow{u}}{1+s\dfrac{\overleftarrow{u}}{c}} \end{cases} \quad \Leftrightarrow \quad \begin{cases} \overleftarrow{u}' = -\dfrac{\vec{u}'}{1+s\dfrac{\vec{u}'}{c}} \\[2ex] \vec{u}' = -\dfrac{\overleftarrow{u}'}{1+s\dfrac{\overleftarrow{u}'}{c}} \end{cases} \tag{2-17}$$

- *Direct and opposite velocities satisfy the following relation* $(1.8-9)$[1]

$$\left(1+s\frac{\overleftarrow{u}}{c}\right)\left(1+s\frac{\vec{u}}{c}\right) = 1 \tag{2-18}$$

- *Armenian gamma functions in the direct and opposite inertial systems have the same mathematical form, but they are not equal to each other* $(1.9-30)$[1], (6)[2], (16)[3]

$$\begin{cases} \text{Armenian gamma function in the direct inertial system} & \rightarrow \quad \gamma_{\text{չ}}\left(\vec{v}\right) = \dfrac{1}{\sqrt{1+s\dfrac{\vec{v}}{c}+g\dfrac{\vec{v}^2}{c^2}}} > 0 \\[3ex] \text{Armenian gamma function in the opposite inertial system} & \rightarrow \quad \gamma_{\text{չ}}\left(\overleftarrow{v}\right) = \dfrac{1}{\sqrt{1+s\dfrac{\overleftarrow{v}}{c}+g\dfrac{\overleftarrow{v}^2}{c^2}}} > 0 \end{cases} \tag{2-19}$$

- *In the direct and opposite inertial systems between corresponding gamma functions, there exists the following very important relations* $(1.9-31,32)$[1], (7)[2], (17)[3]

$$\begin{cases} \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\overleftarrow{v} = -\gamma_{\text{չ}}\left(\vec{v}\right)\vec{v} \\[1ex] \gamma_{\text{չ}}\left(\overleftarrow{v}\right) = \gamma_{\text{չ}}\left(\vec{v}\right)\left(1+s\dfrac{\vec{v}}{c}\right) > 0 \end{cases} \quad \Leftrightarrow \quad \begin{cases} \gamma_{\text{չ}}\left(\vec{v}\right)\vec{v} = -\gamma_{\text{չ}}\left(\overleftarrow{v}\right)\overleftarrow{v} \\[1ex] \gamma_{\text{չ}}\left(\vec{v}\right) = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\left(1+s\dfrac{\overleftarrow{v}}{c}\right) > 0 \end{cases} \tag{2-20}$$

- *There also exists the following symmetric relation* $\left(\text{չ}1-25\right)$[1], (17)[3]

$$\gamma_{\text{չ}}\left(\overleftarrow{v}\right)\left(1+\tfrac{1}{2}s\frac{\overleftarrow{v}}{c}\right) = \gamma_{\text{չ}}\left(\vec{v}\right)\left(1+\tfrac{1}{2}s\frac{\vec{v}}{c}\right) \tag{2-21}$$

- *There exists the following interesting relation as well* $(1.8-24)$[1], (6)[2]

$$\gamma_{\text{չ}}\left(\overleftarrow{v}\right)\gamma_{\text{չ}}\left(\vec{v}\right) = \frac{1+s\dfrac{\vec{v}}{c}}{1+s\dfrac{\vec{v}}{c}+g\dfrac{\vec{v}^2}{c^2}} = \frac{1+s\dfrac{\overleftarrow{v}}{c}}{1+s\dfrac{\overleftarrow{v}}{c}+g\dfrac{\overleftarrow{v}^2}{c^2}} = \frac{1}{1-g\dfrac{\overleftarrow{v}\vec{v}}{c^2}} > 0 \tag{2-22}$$

◆ *In the case of space reversal, the mathematical form of the Armenian formula for addition and subtraction of velocities stays unchanged* $(1.8-29,30)$[1]

In the direct inertial systems | In the opposite inertial systems

$$\begin{cases} \vec{u} = \dfrac{\vec{u}^{\,\prime} + \vec{v} + s\dfrac{\vec{v}\vec{u}^{\,\prime}}{c}}{1 - g\dfrac{\vec{v}\vec{u}^{\,\prime}}{c^2}} \\[3ex] \vec{u}^{\,\prime} = \dfrac{\vec{u} - \vec{v}}{1 + s\dfrac{\vec{v}}{c} + g\dfrac{\vec{v}\vec{u}}{c^2}} \end{cases} \Leftrightarrow \begin{cases} \overleftarrow{u} = \dfrac{\overleftarrow{u}^{\prime} + \overleftarrow{v} + s\dfrac{\overleftarrow{v}\overleftarrow{u}^{\prime}}{c}}{1 - g\dfrac{\overleftarrow{v}\overleftarrow{u}^{\prime}}{c^2}} \\[3ex] \overleftarrow{u}^{\prime} = \dfrac{\overleftarrow{u} - \overleftarrow{v}}{1 + s\dfrac{\overleftarrow{v}}{c} + g\dfrac{\overleftarrow{v}\overleftarrow{u}}{c^2}} \end{cases} \qquad (2\text{-}23)$$

◆ *In the case of space reversal, the mathematical form of the Armenian gamma functions transformations equations stays unchanged* $(1.8-33,34)$[1]

$$\begin{cases} \gamma_{\text{չ}}\left(\vec{u}^{\,\prime}\right) = \gamma_{\text{չ}}\left(\vec{v}\right)\gamma_{\text{չ}}\left(\vec{u}\right)\left(1 + s\dfrac{\vec{v}}{c} + g\dfrac{\vec{v}\vec{u}}{c^2}\right) \\[2ex] \gamma_{\text{չ}}\left(\vec{u}\right) = \gamma_{\text{չ}}\left(\vec{v}\right)\gamma_{\text{չ}}\left(\vec{u}^{\,\prime}\right)\left(1 - g\dfrac{\vec{v}\vec{u}^{\,\prime}}{c^2}\right) \end{cases} \Leftrightarrow \begin{cases} \gamma_{\text{չ}}\left(\overleftarrow{u}^{\prime}\right) = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\gamma_{\text{չ}}\left(\overleftarrow{u}\right)\left(1 + s\dfrac{\overleftarrow{v}}{c} + g\dfrac{\overleftarrow{v}\overleftarrow{u}}{c^2}\right) \\[2ex] \gamma_{\text{չ}}\left(\overleftarrow{u}\right) = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\gamma_{\text{չ}}\left(\overleftarrow{u}^{\prime}\right)\left(1 - g\dfrac{\overleftarrow{v}\overleftarrow{u}^{\prime}}{c^2}\right) \end{cases} \qquad (2\text{-}24)$$

◆ *In the case of space reversal, the mathematical form of the product Armenian gamma functions and corresponding velocities stays unchanged* $(1.8-33,34)$[1]

$$\begin{cases} \gamma_{\text{չ}}\left(\vec{u}^{\,\prime}\right)\vec{u}^{\,\prime} = \gamma_{\text{չ}}\left(\vec{v}\right)\gamma_{\text{չ}}\left(\vec{u}\right)\left(\vec{u} - \vec{v}\right) \\[2ex] \gamma_{\text{չ}}\left(\vec{u}\right)\vec{u} = \gamma_{\text{չ}}\left(\vec{v}\right)\gamma_{\text{չ}}\left(\vec{u}^{\,\prime}\right)\left(\vec{u}^{\,\prime} + \vec{v} + s\dfrac{\vec{v}\vec{u}^{\,\prime}}{c}\right) \end{cases} \Leftrightarrow \begin{cases} \gamma_{\text{չ}}\left(\overleftarrow{u}^{\prime}\right)\overleftarrow{u}^{\prime} = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\gamma_{\text{չ}}\left(\overleftarrow{u}\right)\left(\overleftarrow{u} - \overleftarrow{v}\right) \\[2ex] \gamma_{\text{չ}}\left(\overleftarrow{u}\right)\overleftarrow{u} = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\gamma_{\text{չ}}\left(\overleftarrow{u}^{\prime}\right)\left(\overleftarrow{u}^{\prime} + \overleftarrow{v} + s\dfrac{\overleftarrow{v}\overleftarrow{u}^{\prime}}{c}\right) \end{cases} \qquad (2\text{-}25)$$

Since we now know that in Armenian Theory of Relativity, in the case of only mirror reflection, how time-space $(2-13,15)$ and the velocity $(2-17)$ transforms, and we also know the relation between the direct and opposite gamma functions $(2-20)$, then we need to find out how time-space coordinates between two inertial systems transforms.

◆ *Armenian direct and inverse transformation equations between two (* $\vec{K}$ *and* $\vec{K}^{\prime}$ *) direct (not reflected) inertial systems* $(1.8-25)$[1], (4)[2], $(07,08)$[3]

Armenian direct transformations | Armenian inverse transformations

$$\begin{cases} \vec{t}^{\,\prime} = \gamma_{\text{չ}}\left(\vec{v}\right)\left[\left(1 + s\dfrac{\vec{v}}{c}\right)\vec{t} + g\dfrac{\vec{v}}{c^2}\vec{x}\right] \\[2ex] \vec{x}^{\,\prime} = \gamma_{\text{չ}}\left(\vec{v}\right)\left(\vec{x} - \vec{v}\vec{t}\right) \end{cases} \quad \text{and} \quad \begin{cases} \vec{t} = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\left[\left(1 + s\dfrac{\overleftarrow{v}}{c}\right)\vec{t}^{\,\prime} + g\dfrac{\overleftarrow{v}}{c^2}\vec{x}^{\,\prime}\right] \\[2ex] \vec{x} = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\left(\vec{x}^{\,\prime} - \overleftarrow{v}\vec{t}^{\,\prime}\right) \end{cases} \qquad (2\text{-}26)$$

Remark 4 - *Using relations* $(2-20)$*, from Armenian direct transformation equations* $(2-26)$ *we can easily obtain Armenian inverse transformation equations. Therefore there is no contradiction.*

Now using transformation equations $(2-26)$ and static mirror reflection transformations $(2-13)$ and $(2-15)$, we can obtain Armenian transformation equations between two ($\overleftarrow{K}$ and $\overleftarrow{K}^{\prime}$) opposite (full reflected) inertial systems, as you can see below.

- *Armenian direct and inverse transformation equations between two ($\overleftarrow{K}$ and $\overrightarrow{K}'$) opposite (full reflected) inertial systems*

Armenian direct transformations and Armenian inverse transformations

$$\begin{cases} \overleftarrow{t}' = \gamma_{\zeta}(\overleftarrow{v})\left[\left(1 + s\dfrac{\overleftarrow{v}}{c}\right)\overleftarrow{t} + g\dfrac{\overleftarrow{v}}{c^2}\overleftarrow{x}\right] \\ \overleftarrow{x}' = \gamma_{\zeta}(\overleftarrow{v})\left(\overleftarrow{x} - \overleftarrow{v}\overleftarrow{t}\right) \end{cases} \quad \text{and} \quad \begin{cases} \overleftarrow{t} = \gamma_{\zeta}(\overrightarrow{v})\left[\left(1 + s\dfrac{\overrightarrow{v}}{c}\right)\overleftarrow{t}' + g\dfrac{\overrightarrow{v}}{c^2}\overleftarrow{x}'\right] \\ \overleftarrow{x} = \gamma_{\zeta}(\overrightarrow{v})\left(\overleftarrow{x}' - \overrightarrow{v}\overleftarrow{t}'\right) \end{cases} \tag{2-27}$$

Remark 5 - *We can also obtain Armenian transformation equations* $(2-27)$ *from Armenian transformation equations* $(2-26)$ *by just changing the vector notation sign to the opposite direction in all physical quantities.*

There is some special interest to write down Armenian transformation equations between two different polarity inertial systems, such as between direct and reflected inertial systems or between reflected and direct inertial systems. Below you can see Armenian transformation equations between two such mixed inertial systems.

- *Armenian direct and inverse transformation equations between opposite* $\overleftarrow{K}'$ *and direct* $\overrightarrow{K}$ *inertial systems*

$$\begin{cases} c\overleftarrow{t}' = \gamma_{\zeta}(\overrightarrow{v})\left[c\overrightarrow{t} + \left(s + g\dfrac{\overrightarrow{v}}{c}\right)\overrightarrow{x}\right] \\ \overleftarrow{x}' = -\gamma_{\zeta}(\overrightarrow{v})\left(\overrightarrow{x} - \overrightarrow{v}\overrightarrow{t}\right) \end{cases} \quad \text{and} \quad \begin{cases} c\overrightarrow{t} = \gamma_{\zeta}(\overrightarrow{v})\left[c\overleftarrow{t}' + \left(s + g\dfrac{\overrightarrow{v}}{c}\right)\overleftarrow{x}'\right] \\ \overrightarrow{x} = -\gamma_{\zeta}(\overrightarrow{v})\left(\overleftarrow{x}' - \overrightarrow{v}\overleftarrow{t}'\right) \end{cases} \tag{2-28}$$

- *Armenian direct and inverse transformation equations between direct* $\overrightarrow{K}'$ *and opposite* $\overleftarrow{K}$ *inertial systems*

$$\begin{cases} c\overrightarrow{t}' = \gamma_{\zeta}(\overleftarrow{v})\left[c\overleftarrow{t} + \left(s + g\dfrac{\overleftarrow{v}}{c}\right)\overleftarrow{x}\right] \\ \overrightarrow{x}' = -\gamma_{\zeta}(\overleftarrow{v})\left(\overleftarrow{x} - \overleftarrow{v}\overleftarrow{t}\right) \end{cases} \quad \text{and} \quad \begin{cases} c\overleftarrow{t} = \gamma_{\zeta}(\overleftarrow{v})\left[c\overrightarrow{t}' + \left(s + g\dfrac{\overleftarrow{v}}{c}\right)\overrightarrow{x}'\right] \\ \overleftarrow{x} = -\gamma_{\zeta}(\overleftarrow{v})\left(\overrightarrow{x}' - \overleftarrow{v}\overrightarrow{t}'\right) \end{cases} \tag{2-29}$$

- *From* $(2-26)$ *and* $(2-27)$ *we can obtain the following time differential's relations* $(1.10-8)$[1]

$$\begin{cases} \dfrac{d\overrightarrow{t}'}{d\overrightarrow{t}} = \gamma_{\zeta}(\overrightarrow{v})\left(1 + s\dfrac{\overrightarrow{v}}{c} + g\dfrac{\overrightarrow{v}\overrightarrow{u}}{c^2}\right) \\ \dfrac{d\overleftarrow{t}'}{d\overleftarrow{t}} = \gamma_{\zeta}(\overleftarrow{v})\left(1 + s\dfrac{\overleftarrow{v}}{c} + g\dfrac{\overleftarrow{v}\overleftarrow{u}}{c^2}\right) \end{cases} \quad \text{and} \quad \begin{cases} \dfrac{d\overrightarrow{t}}{d\overrightarrow{t}'} = \gamma_{\zeta}(\overleftarrow{v})\left(1 + s\dfrac{\overleftarrow{v}}{c} + g\dfrac{\overleftarrow{v}\overrightarrow{u}'}{c^2}\right) \\ \dfrac{d\overleftarrow{t}}{d\overleftarrow{t}'} = \gamma_{\zeta}(\overrightarrow{v})\left(1 + s\dfrac{\overrightarrow{v}}{c} + g\dfrac{\overrightarrow{v}\overleftarrow{u}'}{c^2}\right) \end{cases} \tag{2-30}$$

- *From* $(2-28)$ *and* $(2-29)$ *we can also obtain the following time differential's relations*

$$\begin{cases} \dfrac{d\overleftarrow{t}'}{d\overrightarrow{t}} = \gamma_{\zeta}(\overrightarrow{v})\left(1 + s\dfrac{\overrightarrow{u}}{c} + g\dfrac{\overrightarrow{v}\overrightarrow{u}}{c^2}\right) \\ \dfrac{d\overrightarrow{t}'}{d\overleftarrow{t}} = \gamma_{\zeta}(\overleftarrow{v})\left(1 + s\dfrac{\overleftarrow{u}}{c} + g\dfrac{\overleftarrow{v}\overleftarrow{u}}{c^2}\right) \end{cases} \quad \text{and} \quad \begin{cases} \dfrac{d\overrightarrow{t}}{d\overleftarrow{t}'} = \gamma_{\zeta}(\overrightarrow{v})\left(1 + s\dfrac{\overleftarrow{u}'}{c} + g\dfrac{\overrightarrow{v}\overleftarrow{u}'}{c^2}\right) \\ \dfrac{d\overleftarrow{t}}{d\overrightarrow{t}'} = \gamma_{\zeta}(\overleftarrow{v})\left(1 + s\dfrac{\overrightarrow{u}'}{c} + g\dfrac{\overleftarrow{v}\overrightarrow{u}'}{c^2}\right) \end{cases} \tag{2-31}$$

- *In the case of space reversal (mirror reflection), the Armenian interval* *<u>stays invariant</u>* $(1.9-40)$[1]

$$\begin{aligned} \text{Ա}^2\left(\overleftarrow{t},\overleftarrow{x}\right) &= \left(c\overleftarrow{t}\right)^2 + s\left(c\overleftarrow{t}\right)\overleftarrow{x} + g\overleftarrow{x}^2 = \left(c\overrightarrow{t} + s\overrightarrow{x}\right)^2 + s\left(c\overrightarrow{t} + s\overrightarrow{x}\right)\left(-\overrightarrow{x}\right) + g\left(-\overrightarrow{x}\right)^2 = \\ &= \left(c\overrightarrow{t}\right)^2 + s\left(c\overrightarrow{t}\right)\overrightarrow{x} + g\overrightarrow{x}^2 = \text{Ա}^2\left(\overrightarrow{t},\overrightarrow{x}\right) \end{aligned} \tag{2-32}$$

◆ *Armenian formulas for direct and opposite (mirror reflected) accelerations in the inertial systems* K *and* K' *have the following form, but their absolute values do* <u>*not equal each other*</u> $\left(\text{չ}2-3\right)^1$, $(24)^3$

Between $\overleftarrow{K}$ and $\overrightarrow{K}$ inertial systems and Between $\overleftarrow{K}'$ and $\overrightarrow{K}'$ inertial systems

$$\begin{cases} \overleftarrow{a} = -\dfrac{1}{\left(1+s\dfrac{\overrightarrow{u}}{c}\right)^3}\overrightarrow{a} \\ \overrightarrow{a} = -\dfrac{1}{\left(1+s\dfrac{\overleftarrow{u}}{c}\right)^3}\overleftarrow{a} \end{cases} \quad \text{and} \quad \begin{cases} \overleftarrow{a}' = -\dfrac{1}{\left(1+s\dfrac{\overrightarrow{u}'}{c}\right)^3}\overrightarrow{a}' \\ \overrightarrow{a}' = -\dfrac{1}{\left(1+s\dfrac{\overleftarrow{u}'}{c}\right)^3}\overleftarrow{a}' \end{cases} \tag{2-33}$$

◆ *In direct and reflected inertial systems, the test particle's direct and reflected accelerations* $(2-33)$ *satisfy the following relations* $\left(\text{չ}2-4\right)^1$

Between $\overleftarrow{K}$ and $\overrightarrow{K}$ inertial systems and Between $\overleftarrow{K}'$ and $\overrightarrow{K}'$ inertial systems

$$\gamma_{\text{չ}}^3\left(\overleftarrow{u}\right)\overleftarrow{a} = -\gamma_{\text{չ}}^3\left(\overrightarrow{u}\right)\overrightarrow{a} \quad \text{and} \quad \gamma_{\text{չ}}^3\left(\overleftarrow{u}'\right)\overleftarrow{a}' = -\gamma_{\text{չ}}^3\left(\overrightarrow{u}'\right)\overrightarrow{a}' \tag{2-34}$$

◆ *Test particle accelerations transformations between two (* K *and* K' *) inertial systems* $\left(\text{չ}2-5\right)^1$, $(16)^2$, $(25)^3$

Between $\overrightarrow{K}$ and $\overrightarrow{K}'$ direct inertial systems ⇔ Between $\overleftarrow{K}$ and $\overleftarrow{K}'$ opposite inertial systems

$$\begin{cases} \overrightarrow{a} = \dfrac{1}{\gamma_{\text{չ}}^3\left(\overrightarrow{v}\right)\left(1-g\dfrac{\overrightarrow{v}\overrightarrow{u}'}{c^2}\right)^3}\overrightarrow{a}' \\ \overrightarrow{a}' = \dfrac{1}{\gamma_{\text{չ}}^3\left(\overrightarrow{v}\right)\left(1+s\dfrac{\overrightarrow{v}}{c}+g\dfrac{\overrightarrow{v}\overrightarrow{u}}{c^2}\right)^3}\overrightarrow{a} \end{cases} \Leftrightarrow \begin{cases} \overleftarrow{a} = \dfrac{1}{\gamma_{\text{չ}}^3\left(\overleftarrow{v}\right)\left(1-g\dfrac{\overleftarrow{v}\overleftarrow{u}'}{c^2}\right)^3}\overleftarrow{a}' \\ \overleftarrow{a}' = \dfrac{1}{\gamma_{\text{չ}}^3\left(\overleftarrow{v}\right)\left(1+s\dfrac{\overleftarrow{v}}{c}+g\dfrac{\overleftarrow{v}\overleftarrow{u}}{c^2}\right)^3}\overleftarrow{a} \end{cases} \tag{2-35}$$

◆ *Test particle accelerations invariant relations between two inertial systems* K *and* K' $\left(\text{չ}2-6\right)^1$

Between $\overrightarrow{K}$ and $\overrightarrow{K}'$ direct inertial systems ⇔ Between $\overleftarrow{K}$ and $\overleftarrow{K}'$ opposite inertial systems

$$\gamma_{\text{չ}}^3\left(\overrightarrow{u}\right)\overrightarrow{a} = \gamma_{\text{չ}}^3\left(\overrightarrow{u}'\right)\overrightarrow{a}' \quad \Leftrightarrow \quad \gamma_{\text{չ}}^3\left(\overleftarrow{u}\right)\overleftarrow{a} = \gamma_{\text{չ}}^3\left(\overleftarrow{u}'\right)\overleftarrow{a}' \tag{2-36}$$

◆ *According to* $(2-36)$, *for test particle we can define a special acceleration (direct or opposite), calling them -* <u>*Armenian acceleration*</u>, *which stays invariant ether between two direct inertial systems or between two opposite inertial systems* $\left(\text{չ}2-7\right)^1$, $(26)^3$

$$\begin{cases} \overrightarrow{a}_{\text{չ}} = \gamma_{\text{չ}}^3\left(\overrightarrow{u}\right)\overrightarrow{a} = \gamma_{\text{չ}}^3\left(\overrightarrow{u}'\right)\overrightarrow{a}' = \overrightarrow{a}'_{\text{չ}} \\ \overleftarrow{a}_{\text{չ}} = \gamma_{\text{չ}}^3\left(\overleftarrow{u}\right)\overleftarrow{a} = \gamma_{\text{չ}}^3\left(\overleftarrow{u}'\right)\overleftarrow{a}' = \overleftarrow{a}'_{\text{չ}} \end{cases} \tag{2-37}$$

◆ *Also according to* $(2-34)$, *these Armenian accelerations satisfy the following conditions* $\left(\text{չ}2-8\right)^1$, $(27)^3$

$$\begin{cases} \overleftarrow{a}_{\text{չ}} = -\overrightarrow{a}_{\text{չ}} \\ \overleftarrow{a}'_{\text{չ}} = -\overrightarrow{a}'_{\text{չ}} \end{cases} \tag{2-38}$$

◆ *We can also define the Armenian rest mass the following way* $\left(\text{Հ}2-9\right)^1$, $(21)^2$, $(44)^3$

$$\boxed{m_{\text{Հ}0} = -(g - \tfrac{1}{4}s^2)m_0 \gtreqless 0} \qquad (2\text{-}39)$$

◆ *In Armenian mechanics, in the case of space reversal, the least action integrals in* K *and* K' *inertial systems have the same mathematical form* $\left(\text{Հ}2-22,23\right)^1$

In the $\vec{K}$ and $\overleftarrow{K}$ inertial systems

$$\begin{cases} \vec{\text{Ե}}_{\text{Հ}} = -m_0 c^2 \displaystyle\int_{\vec{t}_1}^{\vec{t}_2} \sqrt{1 + s\frac{\vec{u}}{c} + g\frac{\vec{u}^2}{c^2}}\, d\vec{t} \\ \overleftarrow{\text{Ե}}_{\text{Հ}} = -m_0 c^2 \displaystyle\int_{\overleftarrow{t}_1}^{\overleftarrow{t}_2} \sqrt{1 + s\frac{\overleftarrow{u}}{c} + g\frac{\overleftarrow{u}^2}{c^2}}\, d\overleftarrow{t} \end{cases}$$

and

In the $\vec{K}'$ and $\overleftarrow{K}'$ inertial systems

$$\begin{cases} \vec{\text{Ե}}'_{\text{Հ}} = -m_0 c^2 \displaystyle\int_{\vec{t}'_1}^{\vec{t}'_2} \sqrt{1 + s\frac{\vec{u}'}{c} + g\frac{\vec{u}'^2}{c^2}}\, d\vec{t}' \\ \overleftarrow{\text{Ե}}'_{\text{Հ}} = -m_0 c^2 \displaystyle\int_{\overleftarrow{t}'_1}^{\overleftarrow{t}'_2} \sqrt{1 + s\frac{\overleftarrow{u}'}{c} + g\frac{\overleftarrow{u}'^2}{c^2}}\, d\overleftarrow{t}' \end{cases} \qquad (2\text{-}40)$$

◆ *Using* $(2-14)$, $(2-16)$, $(2-20)$, $(2-24)$ *and* $(2-30)$ *formulas we can prove that least action integral quantity* $(2-40)$ *is invariant for all direct and opposite inertial systems* $\left(\text{Հ}2-24\right)^1$

$$\boxed{\overleftarrow{\text{Ե}}_{\text{Հ}} = \vec{\text{Ե}}_{\text{Հ}} = \vec{\text{Ե}}'_{\text{Հ}} = \overleftarrow{\text{Ե}}'_{\text{Հ}} = \text{Ե}_{\text{Հ}}} \qquad (2\text{-}41)$$

◆ *In Armenian mechanics, in the case of space reversal, the Armenian Lagrangian formulas mathematical form in* K *and* K' *inertial systems are invariant but do not equal each other* $\left(\text{Հ}2-22,23\right)^1$

In the $\vec{K}$ and $\overleftarrow{K}$ inertial systems

$$\begin{cases} \vec{\mathcal{L}}_{\text{Հ}} = \mathcal{L}_{\text{Հ}}\left(\vec{u}\right) = -m_0 c^2 \sqrt{1 + s\dfrac{\vec{u}}{c} + g\dfrac{\vec{u}^2}{c^2}} \\ \overleftarrow{\mathcal{L}}_{\text{Հ}} = \mathcal{L}_{\text{Հ}}\left(\overleftarrow{u}\right) = -m_0 c^2 \sqrt{1 + s\dfrac{\overleftarrow{u}}{c} + g\dfrac{\overleftarrow{u}^2}{c^2}} \end{cases}$$

and

In the $\vec{K}'$ and $\overleftarrow{K}'$ inertial systems

$$\begin{cases} \vec{\mathcal{L}}'_{\text{Հ}} = \mathcal{L}_{\text{Հ}}\left(\vec{u}'\right) = -m_0 c^2 \sqrt{1 + s\dfrac{\vec{u}'}{c} + g\dfrac{\vec{u}'^2}{c^2}} \\ \overleftarrow{\mathcal{L}}'_{\text{Հ}} = \mathcal{L}_{\text{Հ}}\left(\overleftarrow{u}'\right) = -m_0 c^2 \sqrt{1 + s\dfrac{\overleftarrow{u}'}{c} + g\dfrac{\overleftarrow{u}'^2}{c^2}} \end{cases} \qquad (2\text{-}42)$$

◆ *In Armenian mechanics, in the case of space reversal, Armenian Lagrangian formulas* $(2-42)$ *between* K *and* K' *inertial systems (direct and opposite) transform in the following way* $\left(\text{Հ}2-25\right)^1$, $(29)^3$

Between $\overleftarrow{K}$ and $\vec{K}$ inertial systems

$$\begin{cases} \mathcal{L}_{\text{Հ}}\left(\overleftarrow{u}\right) = \dfrac{\mathcal{L}_{\text{Հ}}\left(\vec{u}\right)}{1 + s\dfrac{\vec{u}}{c}} \\ \mathcal{L}_{\text{Հ}}\left(\vec{u}\right) = \dfrac{\mathcal{L}_{\text{Հ}}\left(\overleftarrow{u}\right)}{1 + s\dfrac{\overleftarrow{u}}{c}} \end{cases}$$

and

Between $\overleftarrow{K}'$ and $\vec{K}'$ inertial systems

$$\begin{cases} \mathcal{L}_{\text{Հ}}\left(\overleftarrow{u}'\right) = \dfrac{\mathcal{L}_{\text{Հ}}\left(\vec{u}'\right)}{1 + s\dfrac{\vec{u}'}{c}} \\ \mathcal{L}_{\text{Հ}}\left(\vec{u}'\right) = \dfrac{\mathcal{L}_{\text{Հ}}\left(\overleftarrow{u}'\right)}{1 + s\dfrac{\overleftarrow{u}'}{c}} \end{cases} \qquad (2\text{-}43)$$

◆ *Armenian Lagrangian function transformation equations between two (K and K') direct and opposite inertial systems* $\left(\text{չ}2-26^{1}\right)$, $(30)^{3}$

Between $\vec{K}$ and $\vec{K}'$ direct inertial systems — Between $\overleftarrow{K}$ and $\overleftarrow{K}'$ opposite inertial systems

$$\begin{cases} \mathscr{L}_{\text{չ}}\left(\vec{u}'\right) = \dfrac{\sqrt{1+s\dfrac{\vec{v}}{c}+g\dfrac{\vec{v}^{2}}{c^{2}}}}{1+s\dfrac{\vec{v}}{c}+g\dfrac{\vec{v}\vec{u}}{c^{2}}}\mathscr{L}_{\text{չ}}\left(\vec{u}\right) \\ \mathscr{L}_{\text{չ}}\left(\vec{u}\right) = \dfrac{\sqrt{1+s\dfrac{\vec{v}}{c}+g\dfrac{\vec{v}^{2}}{c^{2}}}}{1-g\dfrac{\vec{v}\vec{u}'}{c^{2}}}\mathscr{L}_{\text{չ}}\left(\vec{u}'\right) \end{cases} \Leftrightarrow \begin{cases} \mathscr{L}_{\text{չ}}\left(\overleftarrow{u}'\right) = \dfrac{\sqrt{1+s\dfrac{\overleftarrow{v}}{c}+g\dfrac{\overleftarrow{v}^{2}}{c^{2}}}}{1+s\dfrac{\overleftarrow{v}}{c}+g\dfrac{\overleftarrow{v}\overleftarrow{u}}{c^{2}}}\mathscr{L}_{\text{չ}}\left(\overleftarrow{u}\right) \\ \mathscr{L}_{\text{չ}}\left(\overleftarrow{u}\right) = \dfrac{\sqrt{1+s\dfrac{\overleftarrow{v}}{c}+g\dfrac{\overleftarrow{v}^{2}}{c^{2}}}}{1-g\dfrac{\overleftarrow{v}\overleftarrow{u}'}{c^{2}}}\mathscr{L}_{\text{չ}}\left(\overleftarrow{u}'\right) \end{cases} \tag{2-44}$$

◆ *Armenian energy and Armenian momentum formulas in the direct and opposite inertial systems* $\left(\vec{K}\ \textit{and}\ \overleftarrow{K}\right)$ $\left(\text{չ}2-27\right)^{1}$

In the $\vec{K}$ direct inertial system — In the $\overleftarrow{K}$ opposite inertial system

$$\begin{cases} \vec{E}_{\text{չ}} = E_{\text{չ}}\left(\vec{u}\right) = \dfrac{1+\frac{1}{2}s\dfrac{\vec{u}}{c}}{\sqrt{1+s\dfrac{\vec{u}}{c}+g\dfrac{\vec{u}^{2}}{c^{2}}}}m_{0}c^{2} \\ \vec{P}_{\text{չ}} = P_{\text{չ}}\left(\vec{u}\right) = -\dfrac{\frac{1}{2}s+g\dfrac{\vec{u}}{c}}{\sqrt{1+s\dfrac{\vec{u}}{c}+g\dfrac{\vec{u}^{2}}{c^{2}}}}m_{0}c \end{cases} \Leftrightarrow \begin{cases} \overleftarrow{E}_{\text{չ}} = E_{\text{չ}}\left(\overleftarrow{u}\right) = \dfrac{1+\frac{1}{2}s\dfrac{\overleftarrow{u}}{c}}{\sqrt{1+s\dfrac{\overleftarrow{u}}{c}+g\dfrac{\overleftarrow{u}^{2}}{c^{2}}}}m_{0}c^{2} \\ \overleftarrow{P}_{\text{չ}} = P_{\text{չ}}\left(\overleftarrow{u}\right) = -\dfrac{\frac{1}{2}s+g\dfrac{\overleftarrow{u}}{c}}{\sqrt{1+s\dfrac{\overleftarrow{u}}{c}+g\dfrac{\overleftarrow{u}^{2}}{c^{2}}}}m_{0}c \end{cases} \tag{2-45}$$

◆ *Armenian energy and Armenian momentum formulas in the direct and opposite inertial systems* $\left(\vec{K}'\ \textit{and}\ \overleftarrow{K}'\right)$

In the $\vec{K}'$ direct inertial system — In the $\overleftarrow{K}'$ opposite inertial system

$$\begin{cases} \vec{E}'_{\text{չ}} = E_{\text{չ}}\left(\vec{u}'\right) = \dfrac{1+\frac{1}{2}s\dfrac{\vec{u}'}{c}}{\sqrt{1+s\dfrac{\vec{u}'}{c}+g\dfrac{\vec{u}'^{2}}{c^{2}}}}m_{0}c^{2} \\ \vec{P}'_{\text{չ}} = P_{\text{չ}}\left(\vec{u}'\right) = -\dfrac{\frac{1}{2}s+g\dfrac{\vec{u}'}{c}}{\sqrt{1+s\dfrac{\vec{u}'}{c}+g\dfrac{\vec{u}'^{2}}{c^{2}}}}m_{0}c \end{cases} \Leftrightarrow \begin{cases} \overleftarrow{E}'_{\text{չ}} = E_{\text{չ}}\left(\overleftarrow{u}'\right) = \dfrac{1+\frac{1}{2}s\dfrac{\overleftarrow{u}'}{c}}{\sqrt{1+s\dfrac{\overleftarrow{u}'}{c}+g\dfrac{\overleftarrow{u}'^{2}}{c^{2}}}}m_{0}c^{2} \\ \overleftarrow{P}'_{\text{չ}} = P_{\text{չ}}\left(\overleftarrow{u}'\right) = -\dfrac{\frac{1}{2}s+g\dfrac{\overleftarrow{u}'}{c}}{\sqrt{1+s\dfrac{\overleftarrow{u}'}{c}+g\dfrac{\overleftarrow{u}'^{2}}{c^{2}}}}m_{0}c \end{cases} \tag{2-46}$$

◆ *Armenian energy and Armenian momentum direct and inverse transformation equations between* $\vec{K}$ *and* $\vec{K}'$ *inertial systems* $\left(\text{չ}2-32\right)^{1}$, $(24)^{2}$, $(32,33)^{3}$

Direct transformations — Inverse Transformations

$$\begin{cases} \vec{E}'_{\text{չ}} = \gamma_{\text{չ}}\left(\vec{v}\right)\left(\vec{E}_{\text{չ}}-\vec{v}\vec{P}_{\text{չ}}\right) \\ \vec{P}'_{\text{չ}} = \gamma_{\text{չ}}\left(\vec{v}\right)\left[\left(1+s\dfrac{\vec{v}}{c}\right)\vec{P}_{\text{չ}}+g\dfrac{\vec{v}}{c^{2}}\vec{E}_{\text{չ}}\right] \end{cases} \quad \text{and} \quad \begin{cases} \vec{E}_{\text{չ}} = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\left(\vec{E}'_{\text{չ}}-\overleftarrow{v}\vec{P}'_{\text{չ}}\right) \\ \vec{P}_{\text{չ}} = \gamma_{\text{չ}}\left(\overleftarrow{v}\right)\left[\left(1+s\dfrac{\overleftarrow{v}}{c}\right)\vec{P}'_{\text{չ}}+g\dfrac{\overleftarrow{v}}{c^{2}}\vec{E}'_{\text{չ}}\right] \end{cases} \tag{2-47}$$

- *The test particle full energy Armenian formula* $(\text{Հ}2-33)^{1}$, $(25)^{2}$, $(34)^{3}$

$$\begin{cases} \left(\overrightarrow{P}_{\text{Հ}}\right)^2 + s\overrightarrow{P}_{\text{Հ}}\left(\frac{1}{c}\overrightarrow{E}_{\text{Հ}}\right) + g\left(\frac{1}{c}\overrightarrow{E}_{\text{Հ}}\right)^2 = \left(\overrightarrow{P}'_{\text{Հ}}\right)^2 + s\overrightarrow{P}'_{\text{Հ}}\left(\frac{1}{c}\overrightarrow{E}'_{\text{Հ}}\right) + g\left(\frac{1}{c}\overrightarrow{E}'_{\text{Հ}}\right)^2 = (g-\frac{1}{4}s^2)(m_0c)^2 \\ \left(\overleftarrow{P}_{\text{Հ}}\right)^2 + s\overleftarrow{P}_{\text{Հ}}\left(\frac{1}{c}\overleftarrow{E}_{\text{Հ}}\right) + g\left(\frac{1}{c}\overleftarrow{E}_{\text{Հ}}\right)^2 = \left(\overleftarrow{P}'_{\text{Հ}}\right)^2 + s\overleftarrow{P}'_{\text{Հ}}\left(\frac{1}{c}\overleftarrow{E}'_{\text{Հ}}\right) + g\left(\frac{1}{c}\overleftarrow{E}'_{\text{Հ}}\right)^2 = (g-\frac{1}{4}s^2)(m_0c)^2 \end{cases} \tag{2-48}$$

- *Relation between direct and opposite (reflected) Armenian energy and momentum quantities* $(\text{Հ}2-28)^{1}$

$$\begin{cases} \overleftarrow{E}_{\text{Հ}} = \overrightarrow{E}_{\text{Հ}} = E_{\text{Հ}} \\ \overleftarrow{P}_{\text{Հ}} = -\left(\overrightarrow{P}_{\text{Հ}} + s\frac{1}{c}E_{\text{Հ}}\right) \end{cases} \quad \text{and} \quad \begin{cases} \overleftarrow{E}'_{\text{Հ}} = \overrightarrow{E}'_{\text{Հ}} = E'_{\text{Հ}} \\ \overleftarrow{P}'_{\text{Հ}} = -\left(\overrightarrow{P}'_{\text{Հ}} + s\frac{1}{c}E'_{\text{Հ}}\right) \end{cases} \tag{2-49}$$

- *Differentiating Armenian linear momentum formulas* $(2-45)$ *and* $(2-46)$ *with respect to time, we obtain spatial components of the Armenian force formulas in direct and opposite inertial systems* $(\text{Հ}2-35,37)^{1}$

<u>In the $\overrightarrow{K}$ and $\overrightarrow{K}'$ direct inertial systems</u> — <u>In the $\overleftarrow{K}$ and $\overleftarrow{K}'$ opposite inertial systems</u>

$$\begin{cases} \overrightarrow{F}_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\gamma^3_{\text{Հ}}\left(\overrightarrow{u}\right)\overrightarrow{a} \\ \overrightarrow{F}'_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\gamma^3_{\text{Հ}}\left(\overrightarrow{u}'\right)\overrightarrow{a}' \end{cases} \Leftrightarrow \begin{cases} \overleftarrow{F}_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\gamma^3_{\text{Հ}}\left(\overleftarrow{u}\right)\overleftarrow{a} \\ \overleftarrow{F}'_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\gamma^3_{\text{Հ}}\left(\overleftarrow{u}'\right)\overleftarrow{a}' \end{cases} \tag{2-50}$$

- *Likewise, differentiating Armenian energy formulas* $(2-45)$ *and* $(2-46)$ *with respect to time, we obtain scalar components of the Armenian force formulas in direct and opposite inertial systems* $(\text{Հ}2-36,38)^{1}$

<u>In the $\overrightarrow{K}$ and $\overrightarrow{K}'$ direct inertial systems</u> — <u>In the $\overleftarrow{K}$ and $\overleftarrow{K}'$ opposite inertial systems</u>

$$\begin{cases} \overrightarrow{F}^{0}_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\frac{\overrightarrow{u}}{c}\gamma^3_{\text{Հ}}\left(\overrightarrow{u}\right)\overrightarrow{a} = \frac{\overrightarrow{u}}{c}\overrightarrow{F}_{\text{Հ}} \\ \overrightarrow{F}'^{0}_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\frac{\overrightarrow{u}'}{c}\gamma^3_{\text{Հ}}\left(\overrightarrow{u}'\right)\overrightarrow{a}' = \frac{\overrightarrow{u}'}{c}\overrightarrow{F}'_{\text{Հ}} \end{cases} \Leftrightarrow \begin{cases} \overleftarrow{F}^{0}_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\frac{\overleftarrow{u}}{c}\gamma^3_{\text{Հ}}\left(\overleftarrow{u}\right)\overleftarrow{a} = \frac{\overleftarrow{u}}{c}\overleftarrow{F}_{\text{Հ}} \\ \overleftarrow{F}'^{0}_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\frac{\overleftarrow{u}'}{c}\gamma^3_{\text{Հ}}\left(\overleftarrow{u}'\right)\overleftarrow{a}' = \frac{\overleftarrow{u}'}{c}\overleftarrow{F}'_{\text{Հ}} \end{cases} \tag{2-51}$$

- *In Armenian Theory of Special Relativity <u>Newton's second law</u> can be preserved, if instead of legacy force we use spatial components of Armenian force* $(2-50)$*, instead of legacy rest mass we use Armenian rest mass* $(2-39)$ *and finally instead of legacy acceleration we use Armenian acceleration* $(2-37)$.

<u>*We can call this the Armenian interpretation of Newtonian mechanics.*</u>

<u>In the $\overrightarrow{K}$ and $\overrightarrow{K}'$ direct inertial systems</u> — <u>In the $\overleftarrow{K}$ and $\overleftarrow{K}'$ opposite inertial systems</u>

$$\boxed{\begin{cases} \overrightarrow{F}_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\gamma^3_{\text{Հ}}\left(\overrightarrow{u}\right)\overrightarrow{a} = m_{\text{Հ}0}\overrightarrow{a}_{\text{Հ}} \\ \overrightarrow{F}'_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\gamma^3_{\text{Հ}}\left(\overrightarrow{u}'\right)\overrightarrow{a}' = m_{\text{Հ}0}\overrightarrow{a}_{\text{Հ}} \end{cases} \Leftrightarrow \begin{cases} \overleftarrow{F}_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\gamma^3_{\text{Հ}}\left(\overleftarrow{u}\right)\overleftarrow{a} = m_{\text{Հ}0}\overleftarrow{a}_{\text{Հ}} \\ \overleftarrow{F}'_{\text{Հ}} = -(g-\frac{1}{4}s^2)m_0\gamma^3_{\text{Հ}}\left(\overleftarrow{u}'\right)\overleftarrow{a}' = m_{\text{Հ}0}\overleftarrow{a}_{\text{Հ}} \end{cases}} \tag{2-52}$$

- *From* $(2-38)$ *and* $(2-52)$ *it follows that in Armenian Theory of Special Relativity Newton's first and third laws are also preserved (Armenian interpretation)* $(\text{Հ}2-40)^{1}$, $(46)^{3}$

<u>First law of the Newtonian mechanics</u> — <u>Third law of the Newtonian mechanics</u>

$$\boxed{\begin{cases} \overrightarrow{F}_{\text{Հ}} = \overrightarrow{F}'_{\text{Հ}} \\ \overleftarrow{F}_{\text{Հ}} = \overleftarrow{F}'_{\text{Հ}} \end{cases} \Leftrightarrow \begin{cases} \overleftarrow{F}_{\text{Հ}} = -\overrightarrow{F}_{\text{Հ}} \\ \overleftarrow{F}'_{\text{Հ}} = -\overrightarrow{F}'_{\text{Հ}} \end{cases}} \tag{2-53}$$

Conclusions

If we denote time reversal and space reversal operations by the following notations:

$$\begin{cases} \text{Only time reversal operation} & \rightarrow \quad \widehat{\mathbf{T}} \\ \text{Only space reversal operation} & \rightarrow \quad \widehat{\mathbf{P}} = \widehat{\mathbf{R}}_x{}^{*} \\ \text{Time and space reversal operations together} & \rightarrow \quad \widehat{\mathbf{T}}\widehat{\mathbf{R}}_x \text{ or } \widehat{\mathbf{R}}_x\widehat{\mathbf{T}} \end{cases} \qquad \text{(C-1)}$$

* - In one dimensional space, space-reversal operation is equivalent of mirror reflection about X axis.

Then the concise list of our obtained results in Armenian Theory of Relativity can be seen in the following table:

(C-2)

Time and space reversal transformations	→	$\widehat{\mathbf{T}}$		$\widehat{\mathbf{P}} = \widehat{\mathbf{R}}_x$		$\widehat{\mathbf{T}}\widehat{\mathbf{R}}_x = \widehat{\mathbf{R}}_x\widehat{\mathbf{T}}$
Time-space asymmetry coefficient	→	$-s$	→	s	→	$-s$
Time-space metric coefficient	→	g	→	g	→	g
The test particle event time	→	$-t$	→	$t+s\frac{1}{c}x$	→	$-\left(t+s\frac{1}{c}x\right)$
The test particle position	→	x	→	$-x$	→	$-x$
The test particle mass	→	m	→	m	→	m
The test particle velocity	→	$-u$	→	$-\frac{u}{1+s\frac{u}{c}}$	→	$\frac{u}{1+s\frac{u}{c}}$
The test particle acceleration	→	a	→	$-\frac{1}{\left(1+s\frac{u}{c}\right)^3}a$	→	$-\frac{1}{\left(1+s\frac{u}{c}\right)^3}a$
The test particle Armenian Lagrangian	→	$\mathscr{L}$	→	$\frac{\mathscr{L}}{1+s\frac{u}{c}}$	→	$\frac{\mathscr{L}}{1+s\frac{u}{c}}$
The test particle Armenian energy	→	E	→	E	→	E
The test particle Armenian linear momentum	→	$-P$	→	$-P-s\frac{1}{c}E$	→	$P+s\frac{1}{c}E$
The Armenian spatial force	→	F	→	$-F$	→	$-F$
The Armenian scalar force	→	$-F^0$	→	$\frac{F^0}{1+s\frac{u}{c}}$		$-\frac{F^0}{1+s\frac{u}{c}}$

The laws of legacy mechanics have always shown complete symmetry between the left and the right. As you can see from table (C-2), in Armenian Theory of Relativity there does not exist legacy mechanics mirror symmetry properties and instead there exists complete irregularities. But in Armenian Theory of Relativity the left and right sides are not distinguishable either (as you may have thought) and existing asymmetry is relative because doing the same space-reversal operation two times, brings the particle in the same original state and that is true for each inertial system (direct or opposite).

This is not a violation of parity but this is the new way to define the P-symmetry in asymmetric theory of relativity.

Armenian relativistic formulas is full of asymmetry, which is in every single formula because of coefficient asymmetry s and that asymmetry is the essence and exciting part of the Armenian Theory of Relativity and therefore we demand a revision of all legacy mechanics under these remarkable new circumstances.

The time has also come to reopen NASA's BPP program, but this time using our everywhere existing Armenian asymmetric formulas. This will lead us to harness infinite energy from rest particle's momentum just as we harness energy from the wind using a windmill. Going in this path will bring forth the dawn of a new technological era.

References

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