Einstein-Lorentzian SRT- transformation factor as solution of Planck-scaled oscillation equation

Holger Döring
IQ-Berlin
Germany
e-mail:haw-doering@t-online.de

Abstract:

Shown is the derivation of Lorentz-Einstein k-Factor in SRT as amplitude-term of an oscillation-differential equation of second order with boundary conditions of Planck-scale. This case is shown for classical Lorentz-factor as solution of an equation for undamped oscillation and model of resonance.

key-words:
undamped oscillation; Planck scale; SRT; k-factor; differential-equation of second order; Einstein-Lorentz; amplitude-analogy;

I. Lorentz-Einstein SRT k-factor as an amplitude solution of planck-scaled undamped oscillation equation

1.Introduction

It is obvious to remark the similiarity between the amplitude curves of an undamped oscillation and of k-factor of SRT given by Lorentz and Einstein for velocities which are smaller than light on the one hand [1.],[2.],[5.],[6.] and of Feinberg by FTL [3.] on the other, if both are described and drawed together [4.].Through this similarity there can be tried to get the lorentzian k-factor not only from pure kinematic examinations like in [1.],[2.] and [8.] but as an exact solution of an planck scaled oscillation-equation, as is demanded in [4.] and [9.].

If the oscillation-equation of second order is set in the following form with its Planck-boundaries,, there can be derived the lorentz-k-factor as an solution resp. an interpretation for amplitude of the oscillating system.This shows a deeper connection between quantum theory and classsical SRT.

2.Calculation:

There is the ansatz for the following differential-equation, which can be interpreted as an oscillation-equation for undamped states in case of resonance,

$$\ddot{\psi}+\omega^2{}_{Pl}\cdot\psi=\omega^2{}_{Pl}\cdot e^{i\left(\frac{r}{r_{Pl}}\right)} \qquad (1.)$$

where r is an unknown distance and not a constant but a linear function of time t, which represents the x-coordinate of moving inertial frame:

$$r = r(t) \quad . \tag{2a.}$$

$r_{Pl} = \frac{1}{c^2} \cdot \sqrt{\frac{\hbar \cdot G}{c}} \approx 1{,}616255(18) \cdot 10^{-35}\, m$ is the Planck-length and ω_{Pl} is the Planck-frequency of oscillating universe with

$$\omega_{Pl} = c^2 \cdot \sqrt{\frac{c}{\hbar \cdot G}} \approx 1{,}855 \cdot 10^{43}\, Hz. \quad [7.] \tag{2b.}$$

Later v will be the velocity of a moving body or particle in local inertial frame of flat Minkoswki-Space and c the invariance-velocity by Lorentz-transformations, which occurs here in interpretation as the eigenfrequency-velocity of local space-time.

Also is set:

$$\psi(t) = A^2 \cdot e^{i\left(\frac{r}{r_{Pl}} - \theta\right)} \tag{3a.}$$

as an ansatz for the solution of this equation.

Then there is derivated to second derivation:

$$\ddot{\psi}(t) = A^2 \cdot \left(i \frac{\ddot{r}}{r_{Pl}} - \frac{\dot{r}^2}{r^2_{Pl}}\right) \cdot e^{i\left(\frac{r}{r_{Pl}} - \theta\right)} \tag{3b.}$$

Since $\dot{r} = v = const.$ for the moving of a body in local inertial system, the first term in brackets vanishes.

If (3a.) and (3b.) are set into (1.), there follows the equation:

$$\left(\omega^2_{Pl} - \frac{\dot{r}^2}{r^2_{Pl}}\right) \cdot A^2 \cdot e^{i\left(\frac{r}{r_{Pl}} - \theta\right)} = \omega^2_{Pl} \cdot e^{i\left(\frac{r}{r_{Pl}}\right)} \tag{4.}$$

which gives the following relation:

$$\left(\omega^2_{Pl} - \frac{\dot{r}^2}{r^2_{Pl}}\right) \cdot A^2 = \omega^2_{Pl} \cdot e^{i\theta} \tag{5.}$$

If now the terms are separated seen as a realterm $\Re$ and an imaginary term $\Im$, there is set:

$$\left(\omega^2_{Pl} - \frac{\dot{r}^2}{r^2_{Pl}}\right) \cdot A^2 = \Re = \omega^2_{Pl} \cdot \cos(\theta) \tag{6a.}$$

and

$$0=\Im=\omega^2{}_{Pl}\cdot\sin(\theta) \qquad (6b.)$$

This last term means, that $\theta=0°$ .There is no phase shifting in angle of phase space in classical SRT-term, which leads to the barrier of invariance-velocity c for undamped local spacetime-states with resonance in Minkowski- tangent-space of Pseudo-Riemannian- manifold.

Therefore follows with theorem of Pythagoras $\sin(\theta)^2+\cos(\theta)^2=1$ the relation of:

$$A=\pm\pm i\sqrt{\frac{\omega^2{}_{Pl}}{\omega^2{}_{Pl}-\frac{\dot{r}^2}{r^2{}_{Pl}}}} \qquad (7a.)$$

or

$$A=\pm\pm i\sqrt{\frac{\omega^2{}_{Pl}}{\frac{\dot{r}^2}{r^2{}_{Pl}}-\omega^2{}_{Pl}}} \qquad (7b.)$$

This relation leads finally to Einstein-Lorentzian-transformation factor [1.],[2.] or Feinberg-factor [3.] for FTL with its boundary conditions of:

$\dot{r}^2=v^2=const.$ and $r^2{}_{Pl}\cdot\omega^2{}_{Pl}=c^2$.

3.Result:

If now is chosen the positive real sign-term and the boundary-conditions are set, there is finally following from (7a.):

$$A=\frac{1}{\sqrt{1-\frac{v^2}{c^2}}} \qquad (8a.)$$

and from (7b.):

$$A=\frac{1}{\sqrt{\frac{v^2}{c^2}-1}} \qquad (8b.)$$

These are the classical Lorentz-Einstein-term and the Feinberg-term for moving bodies in local inertial-frames of flat space-time in classical SRT.

4.Discussion:

The similiarity between Einstein-Lorentz-Feinberg k-factors and the amplitudeterm of the model of an undamped oscillation in resonance with the given bounding conditions may be coincidentally of a mere pure mathematically analogy without any physical evidence.But this derivation may throw a new light into the interpretation of local space-time-conditions.Specially the role of the supposed constant length-term r_{Pl} has to be discussed further.It seems that there may be a deep connection between quantum-theory and SRT as a theory of local Spacetime which could be developed to GRT. Also the phase-angle θ must be discussed. For undamped state analogy this angle is equal to zero. Therefore can be concluded, that for phase angles with other values there can be derived a developed SRT-theory for enforced damped states as worked out in [4.], which may unify the broken symmetry of both Einsteinian and Feinberg k-terms.

5.Conclusion:

The classical lorentzian-transformation factor of SRT can be deduced as amplitude of a planckian -oscillation equation of second-order with model of resonance, not only by kinematic discussions in flat Minkowski-space between two light-clocks or two inertial systems moving with constant velocity.This may lead to a deeper sight in connection between local space-time and quantum-theory.In interpretation the basic oscillation-equation may be seen as a description for foundation of the local oscillating universe itself.This equation can be developed to analogy of damped resonance as is described in [4.].

6. References:

[1.] Einstein, A.,Zur Elektrodynamik bewegter Körper,Annalen der Physik ,**322,** 10,1905; https://doi.org/10.1002/andp.19053221004.

[2.] Lorentz, H.A., Elektromagnetische Erscheinungen in einem System, das sich mit beliebiger, die des Lichtes nicht erreichender Geschwindigkeit bewegt.In: Das Relativitätsprinzip – Eine Sammlung von Abhandlungen, Seiten 6-25. Wissenschaftliche Buchgesellschaft, Darmstadt, 6.Auflage 1958.

[3.] Feinberg, G,, Possibility of Faster-Than-Light-Particles, Phys.Rev.**159**,1089, (1967).

[4.] Döring, H. SRT as a Fourth-order-theory with Analogy-model of Damped Resonance. *Preprints* **2021**, 2021040433 (doi:10.20944/preprints 2021104.0433.v1.) (https://www.preprints.org/manuscript/202104.0433/v1).

[5.] Einstein,A., über die spezielle und allgemeine Relativitätstheorie, Vieweg Braunschweig , WTB Nr. 59,21.Auflage,(1979).

[6.] Einstein,A., Grundzüge der Relativitätstheorie, Vieweg Braunschweig, WTB Nr.58,5.Auflage, (1979).

[7.] Planck, M.: Über Irreversible Strahlungsvorgänge. In: Sitzungsbericht der Königlich Preußischen Akademie der Wissenschaften, 1899, erster Halbband S.479-480.

[8.] Lorentz, H.A., Versl. K. Ak. Amsterdam10, 793 (1902); Collected Papers, Vol. 5, .Proc. K. Ak. Amsterdam 6, 809 (1904); Collected Papers, Vol. 5.

[9.] Döring, H. Lorentzian SRT-Transformation Factors as Solutions of Oscillation-Equations. *Preprints* **2021**, 2021050242 (doi:10.20944/preprints 2021105.0242.v2). (https://www.preprints.org/manuscript/202105.0242/v2).