

# $E=mc^2$ Revisited

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2025

$E=mc^2$  Revisited

$E=mc^2 = E=m$ : The Constants Illusion Exposed

Why Einstein's  $c$ -constant conceals the fundamental error

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28. November 2025

## **Zusammenfassung**

This work reveals the central point of Einstein's relativity theory:  $E=mc^2$  is mathematically identical to  $E=m$ . The only difference lies in Einstein's treatment of  $c$  as a "constant" instead of a dynamic ratio. By fixing  $c = 299,792,458$  m/s, the natural time-mass duality  $T \cdot m = 1$  is artificially "frozen," leading to apparent complexity. The T0 theory shows:  $c$  is not a fundamental law of nature, but only a ratio that must be variable if time is variable. Einstein's error was not  $E=mc^2$  itself, but the constant-setting of  $c$ .

# 1 The Central Thesis: $E=mc^2 = E=m$

## The Fundamental Recognition

**$E=mc^2$  and  $E=m$  are mathematically identical!**

The only difference: Einstein treats  $c$  as a "constant", although  $c$  is a dynamic ratio.

**Einstein's error:**  $c = 299,792,458 \text{ m/s} = \text{constant}$

**T0 truth:**  $c = L/T = \text{variable ratio}$

## 1.1 The Mathematical Identity

In natural units:

$$E = mc^2 = m \times c^2 = m \times 1^2 = m \quad (1)$$

This is not an approximation - this is exactly the same equation!

## 1.2 What is $c$ really?

$$c = \frac{\text{Length}}{\text{Time}} = \frac{L}{T} \quad (2)$$

$c$  is a ratio, not a natural constant!

# 2 Einstein's Fundamental Error: The Constant-Setting

## 2.1 The Act of Constant-Setting

Einstein set:  $c = 299,792,458 \text{ m/s} = \text{constant}$

What does this mean?

$$c = \frac{L}{T} = \text{constant} \quad \Rightarrow \quad \frac{L}{T} = \text{fixed} \quad (3)$$

**Implication:** If  $L$  and  $T$  can vary, their **ratio** must remain constant.

## 2.2 The Problem of Time Variability

Einstein recognized himself: Time dilates!

$$t' = \gamma t \quad (\text{time is variable}) \quad (4)$$

But simultaneously he claimed:

$$c = \frac{L}{T} = \text{constant} \quad (5)$$

This is a logical contradiction!

## 2.3 The T0 Resolution

**T0 insight:**  $T \cdot m = 1$

This means:

- Time  $T$  **must** be variable (coupled to mass)
- Therefore  $c = L/T$  **cannot** be constant
- $c$  is a **dynamic ratio**, not a constant

## 3 The Constants Illusion: How it Works

### 3.1 The Mechanism of the Illusion

**Step 1:** Einstein sets  $c = \text{constant}$

$$c = 299,792,458 \text{ m/s} = \text{fixed} \quad (6)$$

**Step 2:** Time becomes "frozen" by this

$$T = \frac{L}{c} = \frac{L}{\text{constant}} = \text{apparently determined} \quad (7)$$

**Step 3:** Time dilation becomes "mysterious effect"

$$t' = \gamma t \quad (\text{why?} \rightarrow \text{complicated relativity theory}) \quad (8)$$

### 3.2 What Really Happens (T0 View)

**Reality:** Time is naturally variable through  $T \cdot m = 1$

**Einstein's constant-setting** "freezes" this natural variability artificially

**Result:** One needs complicated theory to repair the "frozen" dynamics

## 4 c as Ratio vs. c as Constant

### 4.1 c as Natural Ratio (T0)

$$c(x, t) = \frac{L(x, t)}{T(x, t)} \quad (9)$$

**Properties:**

- $c$  varies with location and time
- $c$  follows the time-mass duality
- No artificial constants
- Natural simplicity:  $E = m$

## 4.2 $c$ as Artificial Constant (Einstein)

$$c = 299,792,458 \text{ m/s} = \text{constant everywhere} \quad (10)$$

**Problems:**

- Contradiction to time dilation
- Artificial "freezing" of time dynamics
- Complicated repair mathematics needed
- Inflated formula:  $E = mc^2$

## 5 The Time Dilation Paradox

### 5.1 Einstein's Contradiction Exposed

Einstein claims simultaneously:

$$c = \text{constant} \quad (11)$$

$$t' = \gamma t \quad (\text{time varies}) \quad (12)$$

**But:**

$$c = \frac{L}{T} \quad \text{and} \quad T \text{ varies} \quad \Rightarrow \quad c \text{ cannot be constant!} \quad (13)$$

### 5.2 Einstein's Hidden Solution

Einstein solves "the contradiction through:

- Complicated Lorentz transformations
- Mathematical formalisms
- Space-time constructions
- **But the logical contradiction remains!**

### 5.3 T0's Natural Solution

**No contradiction in T0:**

$$T \cdot m = 1 \quad \Rightarrow \quad \text{time is naturally variable} \quad (14)$$

$$c = \frac{L}{T} \quad \Rightarrow \quad c \text{ is naturally variable} \quad (15)$$

**No constant-setting  $\rightarrow$  No contradictions  $\rightarrow$  No complicated repair mathematics**

## 6 The Mathematical Demonstration

### 6.1 From $E=mc^2$ to $E=m$

Starting equation:  $E = mc^2$

c in natural units:  $c = 1$

Substitution:

$$E = mc^2 = m \times 1^2 = m \quad (16)$$

Result:  $E = m$

### 6.2 The Reverse Direction: From $E=m$ to $E=mc^2$

Starting equation:  $E = m$

Artificial constant introduction:  $c = 299,792,458 \text{ m/s}$

Inflating the equation:

$$E = m = m \times 1 = m \times \frac{c^2}{c^2} = m \times c^2 \times \frac{1}{c^2} \quad (17)$$

If one defines  $c^2$  as "conversion factor":

$$E = mc^2 \quad (18)$$

This shows:  $E = mc^2$  is only  $E = m$  with artificial inflation factor  $c^2$ !

## 7 The Arbitrariness of Constant Choice: c or Time?

### 7.1 Einstein's Arbitrary Decision

#### The Fundamental Choice Option

One can choose what should be "constant"!

Option 1 (Einstein's choice):  $c = \text{constant} \rightarrow \text{time becomes variable}$

Option 2 (alternative):  $\text{time} = \text{constant} \rightarrow c \text{ becomes variable}$

Both describe the same physics!

### 7.2 Option 1: Einstein's c-constant

Einstein chose:

$$c = 299,792,458 \text{ m/s} = \text{constant (defined)} \quad (19)$$

$$t' = \gamma t \quad (\text{time becomes automatically variable}) \quad (20)$$

Language convention:

- "Speed of light is universally constant"
- "Time dilates in strong gravitational fields"
- "Clocks run slower at high velocities"

### 7.3 Option 2: Time-constant (Einstein could have chosen)

Alternative choice:

$$t = \text{constant (defined)} \quad (21)$$

$$c(x, t) = \frac{L(x, t)}{t} = \text{variable} \quad (22)$$

Alternative language convention:

- "Time flows equally everywhere"
- "Speed of light varies with location"
- "Light becomes slower in strong gravitational fields"

### 7.4 Mathematical Equivalence of Both Options

Both descriptions are mathematically identical:

Phenomenon	Einstein view	Time-constant view
Gravitation	Time slows down	Light slows down
Velocity	Time dilation	c-variation
GPS correction	"Clocks run differently"	"c is different"
Measurements	Same numbers	Same numbers

Tabelle 1: Two views, identical physics

### 7.5 Why Einstein Chose Option 1

Historical reasons for Einstein's decision:

- **Michelson-Morley:** c seemed locally constant
- **Aesthetics:** Universal constant bounded elegant
- **Tradition:** Newtonian constant physics
- **Conceivability:** c-constancy easier to imagine than time constancy
- **Authority effect:** Einstein's prestige fixed this choice

But it was only a convention, not a natural law!

## 7.6 T0's Overcoming of Both Options

**T0 shows:** Both choices are arbitrary!

$$T \cdot m = 1 \quad (\text{natural duality without constant constraint}) \quad (23)$$

**T0 insight:**

- **Neither**  $c$  nor time are "really" constant
- **Both** are aspects of the same  $T \cdot m$  dynamics
- **Constancy** is only definition convention
- **$E = m$**  is the constant-free truth

## 7.7 Liberation from Constant Constraint

**Instead of choosing between:**

- $c$  constant, time variable (Einstein)
- Time constant,  $c$  variable (alternative)

**T0 chooses:**

- **Both dynamically coupled** via  $T \cdot m = 1$
- **No arbitrary fixations**
- **Natural ratios** instead of artificial constants

# 8 The Reference Point Revolution: Earth → Sun → Nature

## 8.1 The Reference Point Analogy: Geocentric → Heliocentric → T0

The Reference Point Revolution: From Earth → Sun → Nature

**Geocentric (Ptolemy):** Earth at center

- Complicated epicycles needed
- Works, but artificially complicated

**Heliocentric (Copernicus):** Sun at center

- Simple ellipses
- Much more elegant and simple

**T0-centric:** Natural ratios at center

- $T \cdot m = 1$  (natural reference point)
- Even more elegant:  $E = m$

**Einstein's  $c$ -constant corresponds to the geocentric system:**





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All c-values are relative to each other. None is "constant".

The Moment of Reference Point Setting

Einstein's fatal step:

$$\backslash 80 \backslash 317 \text{ define: } c = 299,792,458 \text{ m/s} = \text{reference point} \quad (23)$$

What happens at this moment: An arbitrary reference point is set All other c-values are measured relative to this The dynamic ratio becomes a "constant" The natural relativity is artificially "frozen"

The Reference Point Problematic

Every reference point is arbitrary: Why 299,792,458 m/s and not 300,000,000 m/s? Why in m/s and not in other units? Why measured on Earth and not in space? Why at this time and not at another?

T0's Reference Point-Free Physics

T0 eliminates all reference points:

$$T \cdot m = 1 \quad (\text{universal relation without reference point}) \quad (23)$$

No arbitrary fixations All ratios remain dynamic Natural relativity is preserved Fundamental simplicity:  $E = m$

Example: The Meter Definition

Historical development of meter definition: 1793: 1 meter = 1/10,000,000 of Earth meridian (Earth reference point) 1889: 1 meter = prototype meter in Paris (object reference point) 1960: 1 meter = 1,650,763.73 wavelengths of krypton-86 (atom reference point) 1983: 1 meter = distance light travels in 1/299,792,458 s (c reference point)

What does this show? Each definition is human arbitrariness The reference point changes with human technology There is no "natural" length unit - only human agreements Humans make c "constant" by definition - not nature!

The Circular Error: Humans Define Their Own "Constants"

In 1983 humans defined:

$$1 \text{ meter} = \frac{1}{299,792,458} \times c \times 1 \text{ second} \quad (23)$$

This makes c automatically "constant" through human definition, not through natural law:

$$c = \frac{299,792,458 \text{ meters}}{1 \text{ second}} = 299,792,458 \text{ m/s} \quad (23)$$

Circular reasoning: Humans define c as constant and then "measure" constant!

Nature is not asked in this process!

T0's Resolution of the Reference Point Illusion

T0 recognizes: Definition  $\neq$  natural law Measurement reference point  $\neq$  physical constant

Practical agreement  $\neq$  fundamental truth

T0 solution:

For measurements: Use practical reference points For natural laws: Use reference point-free relations

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Why c-Constancy is Not Provable

The Fundamental Measurement Problem

To measure c, we need:

$$c = \frac{L}{T} \quad (23)$$

But: We measure L and T with the same physical processes that depend on c!

Circular problem: Light measures distances  $\rightarrow$  c determines L Atomic clocks use EM transitions  $\rightarrow$  c influences T Then we measure  $c = L/T \rightarrow$  We measure c with c!

The Gauge Definition Problem

Since 1983: 1 meter = distance light travels in 1/299,792,458 s

$$c = 299,792,458 \text{ m/s} \quad (\text{not measured, but defined!}) \quad (23)$$

One cannot "prove" what one has defined!

The Systematic Compensation Problem

If c varies, ALL measuring devices vary equally: Laser interferometers: use light (c-dependent) Atomic clocks: use EM transitions (c-dependent) Electronics: uses EM signals (c-dependent)

Result: All devices automatically compensate the c-variation!

The Burden of Proof Problem

Scientifically correct: One cannot prove that something is constant One can only show that it appears constant within measurement precision Each new precision level could show variation

Einstein's "c-constancy" was belief, not proof!

T0 Prediction for Precise Measurements

T0's Universal Validity

$E = m$  is valid everywhere and always: No approximations needed No constant assumptions Universal applicability Fundamental simplicity

The Correction of Physics History

Einstein's True Achievement

Einstein's actual discovery was:

$$E = m \quad (\text{in natural form}) \quad (23)$$

His error was:

$$E = mc^2 \quad (\text{with artificial constant inflation}) \quad (23)$$

The Historical Irony

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When  $E=mc^2$  Fails

The constants illusion breaks down at: Very precise measurements Extreme conditions  
(high energies/masses) Cosmological scales Quantum gravity

Einstein discovered the fundamental simplicity  $E = mc^2$ ,but hid it behind the constants illusion  $E = mc^2$ !

The physics world celebrated the complicated form and overlooked the simple truth.

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The T0 Perspective:  $c$  as Living Ratio $c$  as Expression of Time-Mass Duality

In T0 theory:

$$c(x, t) = f\left(\frac{L(x, t)}{T(x, t)}\right) = f\left(\frac{L(x, t) \cdot m(x, t)}{1}\right) \quad (23)$$

since  $T \cdot m = 1$ . $c$  becomes an expression of the fundamental time-mass duality!

The Dynamic Speed of Light

T0 prediction:

$$c(x, t) = c_0 \left(1 + \xi \frac{m(x, t) - m_0}{m_0}\right) \quad (23)$$

Light moves faster in more massive regions!

(Tiny effect, but measurable in principle)

Experimental Tests of  $c$ -Variability

Proposed Experiments

Test 1 - Gravitational dependence: Measure  $c$  in different gravitational fields T0prediction:  $c$  varies with  $\sim \xi \times \Delta\Phi_{\text{grav}}$ Test 2 - Cosmological variation: Measure  $c$  over cosmological time periods T0prediction:  $c$  changes with universe expansionTest 3 - High-energy physics: Measure  $c$  in particle accelerators at highest energies T0prediction: Tiny deviations at  $E \sim \text{TeV}$ 

Expected Results

Experiment	Einstein ( $c$ constant)	T0 ( $c$ variable)
Gravitational field	$c = 299792458 \text{ m/s}$	$c(1 \pm 10^{-15})$
Cosmological time	$c = \text{constant}$	$c(1 \pm 10^{-12} \times t)$
High energy	$c = \text{constant}$	$c(1 \pm 10^{-16})$

#I#I#IPredicted  $c$  - variations

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## 10 Conclusions

### 10.1 The Central Recognition

#### The Fundamental Truth

 **$E=mc^2 = E=m$** Einstein's "constant"  $c$  is in truth a variable ratio.

The constant-setting was Einstein's fundamental error.

T0 corrects this error by returning to natural variability.

## 10.2 Physics After the Constants Illusion

The future of physics:

- No artificial constants
- Dynamic ratios everywhere
- Living, variable natural laws
- Fundamental simplicity:  $E = m$

## 10.3 Einstein's Corrected Legacy

Einstein's true discovery:  $E = m$  (energy-mass identity)

Einstein's error: Constant-setting of  $c$

T0's correction: Return to natural form  $E = m$

Einstein was brilliant - he just stopped one step too early!

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