

# E=mc<sup>2</sup> Revisited

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# Capítulo 1

## E=mc<sup>2</sup> Revisited

E=mc<sup>2</sup> = E=m: The Constants Illusion Exposed

Why Einstein's c-constant conceals the fundamental error

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## **Resumen**

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  $c = 299,792,458 \text{ m/s}$ , 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  $c$ .

## 1.1. The Central Thesis: E=mc<sup>2</sup> = E=m

The Fundamental Recognition

**E=mc<sup>2</sup> 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 m/s = constant

**To truth:** c = L/T = variable ratio

### 1.1.1. The Mathematical Identity

In natural units:

$$E = mc^2 = m \times c^2 = m \times 1^2 = m \quad (1.1)$$

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

### 1.1.2. What is c really?

$$c = \frac{\text{Length}}{\text{Time}} = \frac{L}{T} \quad (1.2)$$

c is a ratio, not a natural constant!

## 1.2. Einstein's Fundamental Error: The Constant-Setting

### 1.2.1. The Act of Constant-Setting

Einstein set: c = 299,792,458 m/s = **constant**

**What does this mean?**

$$c = \frac{L}{T} = \text{constant} \Rightarrow \frac{L}{T} = \text{fixed} \quad (1.3)$$

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

### 1.2.2. The Problem of Time Variability

**Einstein recognized himself:** Time dilates!

$$t' = \gamma t \quad (\text{time is variable}) \quad (1.4)$$

**But simultaneously he claimed:**

$$c = \frac{L}{T} = \text{constant} \quad (1.5)$$

**This is a logical contradiction!**

### 1.2.3. The T0 Resolution

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

This means:

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

## 1.3. The Constants Illusion: How it Works

### 1.3.1. The Mechanism of the Illusion

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

$$c = 299,792,458 \text{ m/s} = \text{fixed} \quad (1.6)$$

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

$$T = \frac{L}{c} = \frac{L}{\text{constant}} = \text{apparently determined} \quad (1.7)$$

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

$$t' = \gamma t \quad (\text{why?} \rightarrow \text{complicated relativity theory}) \quad (1.8)$$

### 1.3.2. What Really Happens (T0 View)

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

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

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

## 1.4. c as Ratio vs. c as Constant

### 1.4.1. c as Natural Ratio (T0)

$$c(x, t) = \frac{L(x, t)}{T(x, t)} \quad (1.9)$$

**Properties:**

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

### 1.4.2. c as Artificial Constant (Einstein)

$$c = 299,792,458 \text{ m/s} = \text{constant everywhere} \quad (1.10)$$

**Problems:**

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

## 1.5. The Time Dilation Paradox

### 1.5.1. Einstein's Contradiction Exposed

Einstein claims simultaneously:

$$c = \text{constant} \quad (1.11)$$

$$t' = \gamma t \quad (\text{time varies}) \quad (1.12)$$

But:

$$c = \frac{L}{T} \quad \text{and} \quad T \text{ varies} \quad \Rightarrow \quad c \text{ cannot be constant!} \quad (1.13)$$

### 1.5.2. Einstein's Hidden Solution

Einstein "solves" the contradiction through:

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

### 1.5.3. T0's Natural Solution

No contradiction in T0:

$$\cdot m = 1 \quad \Rightarrow \quad \text{time is naturally variable} \quad (1.14)$$

$$c = \frac{L}{T} \quad \Rightarrow \quad c \text{ is naturally variable} \quad (1.15)$$

No constant-setting → No contradictions → No complicated repair mathematics

## 1.6. The Mathematical Demonstration

### 1.6.1. From E=mc<sup>2</sup> to E=m

Starting equation:  $E = mc^2$

c in natural units:  $c = 1$

Substitution:

$$E = mc^2 = m \times 1^2 = m \quad (1.16)$$

Result:  $E = m$

### 1.6.2. The Reverse Direction: From E=m to E=mc<sup>2</sup>

Starting equation:  $E = m$

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

Inflating the equation:

$$E = m = m \times 1 = m \times \frac{c^2}{c^2} = m \times c^2 \times \frac{1}{c^2} \quad (1.17)$$

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

$$E = mc^2 \quad (1.18)$$

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

## 1.7. The Arbitrariness of Constant Choice: c or Time?

### 1.7.1. 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!

### 1.7.2. Option 1: Einstein's c-constant

Einstein chose:

$$c = 299,792,458 \text{ m/s} = \text{constant (defined)} \quad (1.19)$$

$$t' = \gamma t \quad (\text{time becomes automatically variable}) \quad (1.20)$$

Language convention:

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

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

Alternative choice:

$$t = \text{constant (defined)} \quad (1.21)$$

$$c(x, t) = \frac{L(x, t)}{t} = \text{variable} \quad (1.22)$$

Alternative language convention:

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

### 1.7.4. 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"	ç is different"
Measurements	Same numbers	Same numbers

Cuadro 1.1: Two views, identical physics

### 1.7.5. Why Einstein Chose Option 1

Historical reasons for Einstein's decision:

- **Michelson-Morley:** c seemed locally constant
- **Aesthetics:** "Universal constant" sounded 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!

### 1.7.6. T0's Overcoming of Both Options

T0 shows: Both choices are arbitrary!

$$\cdot m = 1 \quad (\text{natural duality without constant constraint}) \quad (1.23)$$

T0 insight:

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

### 1.7.7. 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

## 1.8. The Reference Point Revolution: Earth → Sun → Nature

### 1.8.1. 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

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

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

- **Human** reference point at center (like Earth at center)
- **Complicated** mathematics needed (like epicycles)
- **Works** locally, but artificially inflated

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only becomes \mathsf{constant} when we define a reference point!

Without reference point: All ratios are relative and dynamic

With reference point: One ratio becomes artificially "fixed"

Einstein's error: He defined an absolute reference point for  $c$

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All c-values are relative to each other. None is \80\347onstant".

The Moment of Reference Point Setting  
Einstein's fatal step:

$$\backslash80\317 \text{ define: } c = 299,792,458 \text{ m/s} = \text{reference point} \quad (1.23)$$

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 \80\347onstant" 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:

$$\cdot m = 1 \quad (\text{universal relation without reference point}) \quad (1.23)$$

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 \80\347onstant" by definition - not nature!

The Circular Error: Humans Define Their Own \80\307onstants

In 1983 humans defined:

$$1 \text{ meter} = \frac{1}{299,792,458} \times c \times 1 \text{ second} \quad (1.23)$$

This makes c automatically \80\347onstant through human  
definition, not through natural law:

$$c = \frac{299,792,458 \text{ meters}}{1 \text{ second}} = 299,792,458 \text{ m/s} \quad (1.23)$$

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

Nature is not asked in this process!

T0's Resolution of the Reference Point Illusion

T0 recognizes: Definition  $\neq$  natural law Measurement ref-

bt

Since all theories are constructs:  
Evaluation criteria are:

Simplicity (fewer assumptions) Consistency (no contradictions) Predictive power  
(testable consequences) Elegance (aesthetic criteria) Unity (fewer separate domains)

By all these criteria T0 is "better" than Einstein - but not .absolutely true".

### The Ontological Humility

The deepest insight: Reality itself is inaccessible All theories are human constructs Mathematical consistency proves no ontological truth The best we have: Simpler, more consistent constructs

Einstein's error was not only the c-constant setting, but also the claim to absolute truth of his mathematical constructs.

T0's advantage is not absolute truth, but relative superiority as a thought model.

### The Practical Consequences

#### Why $E=mc^2$ Works

$E=mc^2$  works because: It is mathematically identical to  $E = m c^2$  compensates the "frozen" time dynamics The T0 truth is unconsciously contained Local approximations usually suffice

#### When $E=mc^2$ Fails

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

### 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:

$$E = m \quad (\text{in natural form}) \quad (1.23)$$

His error was:

$$E = mc^2 \quad (\text{with artificial constant inflation}) \quad (1.23)$$

### The Historical Irony

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### The Pragmatic Consequence

nstein discovered the fundamental simplicity  $E = m$ ,  
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:

$$c(x, t) = f \left( \frac{L(x, t)}{(x, t)} \right) = f \left( \frac{L(x, t) \cdot m(x, t)}{1} \right) \quad (1.23)$$

since  $\cdot m = 1$ .

c becomes an expression of the fundamental time-mass duality!

The Dynamic Speed of Light  
T0 prediction:

$$c(x, t) = c_0 1 + \xi \frac{m(x, t) - m_0}{m_0} \quad (1.23)$$

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 T0 prediction:  $c$  varies with  $\sim \xi \times \Delta \Phi_{\text{grav}}$

Test 2 - Cosmological variation:

Measure c over cosmological time periods T0 prediction:  $c$  changes with universe expansion

Test 3 - High-energy physics:

Measure c in particle accelerators at highest energies T0 prediction: Tiny deviations at  $E \sim \text{TeV}$

### Expected Results

b!#I l c c heightExperiment	Einstein (c constant)	T0 (c variable)
Gravitational field	$c = 299792458 \text{ m/s}$	$c(1pm10^{-15})$
Cosmological time	$c = \text{constant}$	$c(1 + 10^{-12} \times t)$
High energy	$c = \text{constant}$	$c(1 + 10^{-16})$
#I#I#IPredicted c-variations		#I

## 1.10. Conclusions

### 1.10.1. The Central Recognition

#### The Fundamental Truth

$$\mathbf{E=mc^2 = E=m}$$

Einstein's constant is in truth a variable ratio.

The constant-setting was Einstein's fundamental error.

T0 corrects this error by returning to natural variability.

### 1.10.2. Physics After the Constants Illusion

The future of physics:

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

### 1.10.3. 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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