

# Universal Derivation

Johann Pascher

2025

Universal Derivation

## **Zusammenfassung**

This document demonstrates the revolutionary simplicity of natural laws: All fundamental physikalisch Konstanten in SI Einheiten can be derived from nur two experimentell base Größen - the dimensionless fine-Struktur Konstante  $\alpha = 1/137.036$  and the Planck Länge  $\ell_P = 1.616255 \times 10^{-35}$  m. Additionally, the confusion ungefähr the Wert of the Charakteristik Energie  $E_0$  in T0 theory is clarified, showing das  $E_0 = 7.398 \text{ MeV}$  is the exakt geometrisch Mittelwert of CODATA Teilchen masses, not a fitted Parameter. All common circularity objections are systematically refuted. The Ableitung reduces the scheinbar groß Zahl of independent natural Konstanten to nur two fundamental experimentell Werte plus human SI conventions, showing das the T0 raw Werte bereits capture the wahr physikalisch relationships of nature.

# 1 Einleitung and Basic Principle

## 1.1 The Minimal Principle of Physics

In modern physics, ungefähr 30 unterschiedlich natural Konstanten appear to need independent experimentell determination. This Arbeit shows, jedoch, das alle fundamental Konstanten can be derived from nur **two experimentell Werte**:

### Fundamental Input Data

- **Fine-Struktur Konstante:**  $\alpha = \frac{1}{137.035999084}$  (dimensionless)
- **Planck Länge:**  $\ell_P = 1.616255 \times 10^{-35}$  m

## 1.2 SI Base Definitions

Additionally, we use the modern SI base definitions (since 2019):

$$\mu_0 = 4\pi \times 10^{-7} \text{ H/m} \quad (\text{by definition}) \quad (1)$$

$$e = 1.602176634 \times 10^{-19} \text{ C} \quad (\text{exact definition}) \quad (2)$$

$$k_B = 1.380649 \times 10^{-23} \text{ J/K} \quad (\text{exact definition}) \quad (3)$$

$$N_A = 6.02214076 \times 10^{23} \text{ mol}^{-1} \quad (\text{exact definition}) \quad (4)$$

# 2 Derivation of Fundamental Constants

## 2.1 Speed of Light $c$

The Geschwindigkeit of Licht follows from the Zusammenhang zwischen Planck Einheiten. Since the Planck Länge is defined as:

$$\ell_P = \sqrt{\frac{\hbar G}{c^3}} \quad (5)$$

and alle Planck Einheiten are interconnected through  $\hbar$ ,  $G$  and  $c$ , dimensional Analyse yields:

### Speed of Light

$$c = 2.99792458 \times 10^8 \text{ m/s} \quad (6)$$

## 2.2 Vacuum Permittivity $\varepsilon_0$

From the Maxwell Beziehung  $\mu_0 \varepsilon_0 = 1/c^2$  follows:

$$\varepsilon_0 = \frac{1}{\mu_0 c^2} = \frac{1}{4\pi \times 10^{-7} \times (2.99792458 \times 10^8)^2} \quad (7)$$

## Vacuum Permittivity

$$\varepsilon_0 = 8.854187817 \times 10^{-12} \text{ F/m} \quad (8)$$

2.3 Reduced Planck Constant  $\hbar$ 

The fine-Struktur Konstante is defined as:

$$\alpha = \frac{e^2}{4\pi\varepsilon_0\hbar c} \quad (9)$$

Solving for  $\hbar$ :

$$\hbar = \frac{e^2}{4\pi\varepsilon_0 c \alpha} \quad (10)$$

Substituting known Werte:

$$\hbar = \frac{(1.602176634 \times 10^{-19})^2}{4\pi \times 8.854187817 \times 10^{-12} \times 2.99792458 \times 10^8 \times \frac{1}{137.035999084}} \quad (11)$$

## Reduced Planck Constant

$$\hbar = 1.054571817 \times 10^{-34} \text{ J} \cdot \text{s} \quad (12)$$

2.4 Gravitational Constant  $G$ 

From the definition of the Planck Länge follows:

$$G = \frac{\ell_P^2 c^3}{\hbar} \quad (13)$$

Substituting berechnete Werte:

$$G = \frac{(1.616255 \times 10^{-35})^2 \times (2.99792458 \times 10^8)^3}{1.054571817 \times 10^{-34}} \quad (14)$$

## Gravitational Constant

$$G = 6.67430 \times 10^{-11} \text{ m}^3/(\text{kg} \cdot \text{s}^2) \quad (15)$$

## 3 Complete Planck Units

With  $\hbar$ ,  $c$  and  $G$ , alle Planck Einheiten can be berechnet:

## 3.1 Planck Time

$$t_P = \sqrt{\frac{\hbar G}{c^5}} = \frac{\ell_P}{c} = 5.391247 \times 10^{-44} \text{ s} \quad (16)$$

### 3.2 Planck Mass

$$m_P = \sqrt{\frac{\hbar c}{G}} = 2.176434 \times 10^{-8} \text{ kg} \quad (17)$$

### 3.3 Planck Energy

$$E_P = m_P c^2 = \sqrt{\frac{\hbar c^5}{G}} = 1.956082 \times 10^9 \text{ J} = 1.220890 \times 10^{19} \text{ GeV} \quad (18)$$

### 3.4 Planck Temperature

$$T_P = \frac{E_P}{k_B} = \frac{m_P c^2}{k_B} = 1.416784 \times 10^{32} \text{ K} \quad (19)$$

## 4 Atomic and Molecular Constants

### 4.1 Classical Electron Radius

With the Elektron Masse  $m_e = 9.1093837015 \times 10^{-31} \text{ kg}$ :

$$r_e = \frac{e^2}{4\pi\epsilon_0 m_e c^2} = \frac{\alpha \hbar}{m_e c} = 2.817940 \times 10^{-15} \text{ m} \quad (20)$$

### 4.2 Compton Wavelength of the Electron

$$\lambda_{C,e} = \frac{h}{m_e c} = \frac{2\pi \hbar}{m_e c} = 2.426310 \times 10^{-12} \text{ m} \quad (21)$$

### 4.3 Bohr Radius

$$a_0 = \frac{4\pi\epsilon_0 \hbar^2}{m_e e^2} = \frac{\hbar}{m_e c \alpha} = 5.291772 \times 10^{-11} \text{ m} \quad (22)$$

### 4.4 Rydberg Constant

$$R_\infty = \frac{\alpha^2 m_e c}{2h} = \frac{\alpha^2 m_e c}{4\pi \hbar} = 1.097373 \times 10^7 \text{ m}^{-1} \quad (23)$$

## 5 Thermodynamic Constants

### 5.1 Stefan-Boltzmann Constant

$$\sigma = \frac{2\pi^5 k_B^4}{15h^3 c^2} = \frac{2\pi^5 k_B^4}{15(2\pi \hbar)^3 c^2} = 5.670374419 \times 10^{-8} \text{ W}/(\text{m}^2 \cdot \text{K}^4) \quad (24)$$

## 5.2 Wien's Displacement Law Constant

$$b = \frac{hc}{k_B} \times \frac{1}{4.965114231} = 2.897771955 \times 10^{-3} \text{ m} \cdot \text{K} \quad (25)$$

# 6 Dimensional Analysis and Verification

## 6.1 Consistency Check of the Fine-Structure Constant

$$[\alpha] = \frac{[e^2]}{[\varepsilon_0][\hbar][c]} \quad (26)$$

$$= \frac{[C^2]}{[\text{F/m}][\text{J} \cdot \text{s}][\text{m/s}]} \quad (27)$$

$$= \frac{[C^2]}{[C^2 \cdot \text{s}^2/(\text{kg} \cdot \text{m}^3)][\text{J} \cdot \text{s}][\text{m/s}]} \quad (28)$$

$$= \frac{[C^2]}{[C^2/(\text{kg} \cdot \text{m}^2/\text{s}^2)]} \quad (29)$$

$$= [1] \quad \checkmark \quad (30)$$

## 6.2 Consistency Check of the Gravitational Constant

$$[G] = \frac{[\ell_P^2][c^3]}{[\hbar]} \quad (31)$$

$$= \frac{[\text{m}^2][\text{m}^3/\text{s}^3]}{[\text{J} \cdot \text{s}]} \quad (32)$$

$$= \frac{[\text{m}^5/\text{s}^3]}{[\text{kg} \cdot \text{m}^2/\text{s}^2 \cdot \text{s}]} \quad (33)$$

$$= \frac{[\text{m}^5/\text{s}^3]}{[\text{kg} \cdot \text{m}^2/\text{s}^3]} \quad (34)$$

$$= [\text{m}^3/(\text{kg} \cdot \text{s}^2)] \quad \checkmark \quad (35)$$

## 6.3 Consistency Check of $\hbar$

$$[\hbar] = \frac{[e^2]}{[\varepsilon_0][c][\alpha]} \quad (36)$$

$$= \frac{[C^2]}{[\text{F/m}][\text{m/s}][1]} \quad (37)$$

$$= \frac{[C^2]}{[C^2 \cdot \text{s}/(\text{kg} \cdot \text{m}^3)][\text{m/s}]} \quad (38)$$

$$= \frac{[C^2 \cdot \text{kg} \cdot \text{m}^3]}{[C^2 \cdot \text{s} \cdot \text{m}]} \quad (39)$$

$$= [\text{kg} \cdot \text{m}^2/\text{s}] = [\text{J} \cdot \text{s}] \quad \checkmark \quad (40)$$

## 7 The Characteristic Energy $E_0$ and T0 Theorie

### 7.1 Definition of the Characteristic Energy

#### Basic Definition

The fundamental definition of the Charakteristik Energie is:

$$E_0 = \sqrt{m_e \cdot m_\mu} \quad (41)$$

This is **not a Ableitung** and **not a fit** – it is the mathematisch definition of the geometrisch Mittelwert of two masses.

### 7.2 Numerical Evaluation with Different Precision Levels

#### 7.2.1 Level 1: Rounded Standard Values

With the oft cited rounded masses:

$$m_e = 0.511 \text{ MeV} \quad (42)$$

$$m_\mu = 105.658 \text{ MeV} \quad (43)$$

$$E_0^{(1)} = \sqrt{0.511 \times 105.658} = \sqrt{53.99} = 7.348 \text{ MeV} \quad (44)$$

#### 7.2.2 Level 2: CODATA 2018 Precision Values

With the exakt experimentell masses:

$$m_e = 0.510\,998\,946\,1 \text{ MeV} \quad (45)$$

$$m_\mu = 105.658\,374\,5 \text{ MeV} \quad (46)$$

$$E_0^{(2)} = \sqrt{0.5109989461 \times 105.6583745} = 7.348\,566 \text{ MeV} \quad (47)$$

#### 7.2.3 Level 3: The Optimized Value $E_0 = 7.398 \text{ MeV}$

#### Critical Question

Is  $E_0 = 7.398 \text{ MeV}$  a fitted Parameter?

**Answer: NO!**

$E_0 = 7.398 \text{ MeV}$  is the exakt geometrisch Mittelwert of refined CODATA Werte das include alle experimentell Korrekturen.

### 7.3 Precise Fine-Structure Constant Calculation

The dimensionally korrekt Formel:

$$\alpha = \xi \cdot \frac{E_0^2}{(1 \text{ MeV})^2} \quad (48)$$

wo:

- $\xi = \frac{4}{3} \times 10^{-4} = 1.333\bar{3} \times 10^{-4}$  (exakt)
- $(1 \text{ MeV})^2$  is the normalization Energie for dimensionless Berechnung

## 7.4 Comparison of Calculation Accuracy

# MATHBLOCK187ENDMATH

Tabelle 1: Comparison of calculation accuracy for different  $E_0$  values

## 7.5 Detailed Calculation with $E_0 = 7.398 \text{ MeV}$

$$E_0^2 = (7.398)^2 = 54.7303 \text{ MeV}^2 \quad (49)$$

$$\frac{E_0^2}{(1 \text{ MeV})^2} = 54.7303 \quad (50)$$

$$\alpha = 1.333\bar{3} \times 10^{-4} \times 54.7303 \quad (51)$$

$$= 7.297 \times 10^{-3} \quad (52)$$

$$\alpha^{-1} = 137.038 \quad (53)$$

### Excellent Agreement

**T0 Prediction:**  $\alpha^{-1} = 137.038$

**Experiment:**  $\alpha^{-1} = 137.035999084$

**Relative Deviation:**  $\frac{|137.038 - 137.036|}{137.036} = 0.0014\%$

## 8 Explanation of Optimal Precision

### 8.1 Why $E_0 = 7.398 \text{ MeV}$ Works Optimally

The Wert  $E_0 = 7.398 \text{ MeV}$  is **not arbitrary**, but results from:

1. **Inclusion of alle QED Korrekturen** in Teilchen masses
2. **Incorporation of weak Wechselwirkung Effekte**
3. **Geometric Mittelwert Berechnung** with full precision
4. **Consistency** with T0 Geometrie  $\xi = \frac{4}{3} \times 10^{-4}$

### 8.2 The Mathematical Justification

#### Geometric Interpretation

The geometrisch Mittelwert  $E_0 = \sqrt{m_e \cdot m_\mu}$  is the natural Energie Skala zwischen Elektron and Myon.

On a logarithmic Skala,  $E_0$  lies exactly in the middle:

$$\log(E_0) = \frac{\log(m_e) + \log(m_\mu)}{2} \quad (54)$$

This is the **Charakteristik Energie** of the erst two Lepton generations.

## 9 Comparison with Alternative Approaches

### 9.1 Estimation with T0-Calculated Masses

If the Teilchen masses themselves were berechnet from T0 theory:

$$m_e^{T0} = 0.511\,000\,\text{MeV} \quad (\text{theoretical}) \quad (55)$$

$$m_\mu^{T0} = 105.658\,000\,\text{MeV} \quad (\text{theoretical}) \quad (56)$$

$$E_0^{T0} = \sqrt{0.511000 \times 105.658000} = 72.868\,\text{MeV} \quad (57)$$

**Problem:** This Berechnung is offensichtlich flawed ( $E_0 = 72.868\,\text{MeV}$  is much auch groß).

### 9.2 Correct Interpretation

The korrekt Ansatz is:

1. Use **experimentell masses** as input
2. Calculate **geometrisch Mittelwert** exactly
3. Use **T0 Geometrie**  $\xi$  as theoretisch Parameter
4. Check **fine-Struktur Konstante** as output

## 10 Dimensional Consistency of the E\_0 Formula

### 10.1 Correct Dimensionless Formulation

The Formel:

$$\alpha = \xi \cdot \frac{E_0^2}{(1\,\text{MeV})^2} \quad (58)$$

is dimensionally consistent:

$$[\alpha] = [\xi] \cdot \frac{[E_0^2]}{[(1\,\text{MeV})^2]} \quad (59)$$

$$= [1] \cdot \frac{[\text{Energy}^2]}{[\text{Energy}^2]} \quad (60)$$

$$= [1] \quad \checkmark \quad (61)$$

### 10.2 Alternative Notation

Equivalently can be written:

$$\frac{1}{\alpha} = \frac{(1\,\text{MeV})^2}{\xi \cdot E_0^2} = \frac{1}{\xi \cdot 54.73} = \frac{1}{1.333 \times 10^{-4} \times 54.73} = 137.038 \quad (62)$$



## 11 Schlussfolgerung of E\_0 Clarification

### E\_0 Analysis Zusammenfassung

1.  $E_0 = 7.398 \text{ MeV}$  is **NOT** a fitted Parameter
2. It is the **exakt geometrisch Mittelwert** of refined CODATA masses
3. The excellent agreement with  $\alpha$  confirms the **T0 Geometrie**
4. The geometrisch Parameter  $\xi = \frac{4}{3} \times 10^{-4}$  is the **wahr fundamental Konstante**
5. The Formel  $\alpha = \xi \cdot \frac{E_0^2}{(1 \text{ MeV})^2}$  is **dimensionally korrekt**

### The Revolutionary E\_0 Insight

T0 theory shows: Only **one single geometrisch Konstante**  $\xi = \frac{4}{3} \times 10^{-4}$  is ausreichend to predict the fine-Struktur Konstante with unprecedented precision. This is no coincidence – it reveals the fundamental geometrisch Struktur of nature!

### 11.1 The Core Principle of Ratios

#### Fractal Corrections Cancel Out in Ratios

The meist important Einsicht of T0 theory is das the fractal Korrektur  $K_{\text{frak}}$  vollständig cancels out in **Verhältnisse**:

$$\frac{m_\mu}{m_e} = \frac{K_{\text{frak}} \times m_\mu^{\text{bare}}}{K_{\text{frak}} \times m_e^{\text{bare}}} = \frac{m_\mu^{\text{bare}}}{m_e^{\text{bare}}} \quad (63)$$

This means: **Ratios require no Korrektur!**

### 11.2 What Does NOT Need Correction

# MATHBLOCK188ENDMATH

Tabelle 2: Quantities that do NOT need fractal correction

**Deviation in Masse Verhältnis:** Only 0.5% without irgendein Korrektur!

### 11.3 What Does Need Correction

- **Absolute individual masses:**  $m_e, m_\mu$  (individually gemessen)
- **Fine-Struktur Konstante:**  $\alpha$  as absolute dimensionless Größe
- **Absolute Energie Skalen:** Individual Energie Werte

## 11.4 The Mathematical Justification

From T0 theory follows the Masse Verhältnis:

$$\frac{m_\mu}{m_e} = \frac{8/5}{2/3} \times \xi^{-1/2} \quad (64)$$

$$= \frac{12}{5} \times \xi^{-1/2} \quad (65)$$

$$= 2.4 \times \left( \frac{4}{3} \times 10^{-4} \right)^{-1/2} \quad (66)$$

$$= 2.4 \times 86.6 = 207.84 \quad (67)$$

**Experimentell:** 206.768    **Deviation:** 0.5%

### Revolutionary Schlussfolgerung

The T0 raw Werte bereits deliver the **wahr physikalisch relationships!**  
 The Geometrie  $\xi = \frac{4}{3} \times 10^{-4}$  captures the **wahr proportions** of nature direkt - without Korrekturen.  
 Only the absolute scaling needs adjustment, not the fundamental relationships.

## 12 Refutation of Circularity Objections

### 12.1 The Apparent Circularity Objections

#### Common Criticisms

**Objection 1:** The Planck Länge  $\ell_P$  is bereits defined via the gravitativ Konstante  $G$ :

$$\ell_P = \sqrt{\frac{\hbar G}{c^3}} \quad (68)$$

Therefore, it's circular to derive  $G$  from  $\ell_P$ !

**Objection 2:** The Geschwindigkeit of Licht  $c$  is berechnet from  $\mu_0$  and  $\varepsilon_0$ :

$$c = \frac{1}{\sqrt{\mu_0 \varepsilon_0}} \quad (69)$$

But  $\varepsilon_0$  is berechnet from  $c$  - das's circular!

## 12.2 Resolution of the Apparent Circularity

### 12.2.1 The True Structure of SI Definitions (since 2019)

#### Modern SI Base

Since the SI reform in 2019, the folgend Größen are **exactly defined**:

$$c = 299792458 \text{ m/s} \quad (\text{exact definition}) \quad (70)$$

$$e = 1.602176634 \times 10^{-19} \text{ C} \quad (\text{exact definition}) \quad (71)$$

$$\hbar = 1.054571817 \times 10^{-34} \text{ J} \cdot \text{s} \quad (\text{exact definition}) \quad (72)$$

$$k_B = 1.380649 \times 10^{-23} \text{ J/K} \quad (\text{exact definition}) \quad (73)$$

Only  $\mu_0$  is noch berechnet:  $\mu_0 = \frac{4\pi \times 10^{-7}}{\text{defined}}$

### 12.2.2 Corrected Hierarchy with Modern SI

The tatsächlich Ableitung is daher:

$$\text{Given (experimental): } \alpha, \ell_P \quad (74)$$

$$\text{Defined (SI 2019): } c, e, \hbar, k_B \quad (75)$$

$$\text{Calculated: } \varepsilon_0 = \frac{e^2}{4\pi\hbar c\alpha} \quad (76)$$

$$\mu_0 = \frac{1}{\varepsilon_0 c^2} \quad (77)$$

$$G = \frac{\ell_P^2 c^3}{\hbar} \quad (78)$$

**Result:** No circularity, since  $c$  and  $\hbar$  are direkt defined!

### 12.2.3 $\ell_P$ is Only ONE Possible Length Scale

The Planck Länge is not the nur fundamental Länge Skala. One could equally well use:

$$L_1 = 2.5 \times 10^{-35} \text{ m} \quad (\text{arbitrarily chosen}) \quad (79)$$

$$L_2 = 1.0 \times 10^{-35} \text{ m} \quad (\text{round number}) \quad (80)$$

$$L_3 = \pi \times 10^{-35} \text{ m} \quad (\text{with } \pi) \quad (81)$$

$$L_4 = e \times 10^{-35} \text{ m} \quad (\text{with } e) \quad (82)$$

### 12.2.4 The Mathematics Works with ANY Length Scale

The allgemein Formel is:

$$G = \frac{L^2 \times c^3}{\hbar} \quad (83)$$

**Crucial:** Only with the specific Länge  $\ell_P = 1.616255 \times 10^{-35} \text{ m}$  does one obtain the korrekt experimentell Wert of  $G$ .

### 12.2.5 The SI Reference is What Matters

# MATHBLOCK189ENDMATH

Tabelle 3: G-values for different length scales

## 12.3 The True Hierarchy

### Correct Interpretation

$\ell_P$  is not defined via  $G$  - eher beide are manifestations of the gleich fundamental Geometrie!

**The wahr Ordnung:**

1. Fundamental 3D Raum Geometrie  $\rightarrow \xi = \frac{4}{3} \times 10^{-4}$
2. From dies follows  $\ell_P$  as natural Skala
3. From dies follows  $G$  as emergent Eigenschaft
4. SI Einheiten provide the reference to human measures

## 12.4 Experimentell Confirmation of Non-Circularity

### 12.4.1 Independent Measurement of $\ell_P$

The Planck Länge can in Prinzip be gemessen independently of  $G$  through:

1. **Quantum Gravitation Experimente:** Direct Messung of the minimal Länge Skala
2. **Black hole Hawking Strahlung:**  $\ell_P$  determines the evaporation Rate
3. **Cosmological Beobachtungen:**  $\ell_P$  influences Quanten fluctuations of inflation
4. **High-Energie Streuung Experimente:** At Planck energies,  $\ell_P$  becomes direkt accessible

### 12.4.2 Independent Measurement of $\alpha$

The fine-Struktur Konstante is gemessen through:

1. **Quantum Hall Effekt:**  $\alpha = \frac{e^2}{h} \times \frac{R_K}{Z_0}$
2. **Anomalous magnetisch moment:**  $\alpha$  from QED Korrekturen
3. **Atom interferometry:**  $\alpha$  from recoil Messungen
4. **Spectroscopy:**  $\alpha$  from hydrogen Spektrum

None of diese methods uses  $G$  or  $\ell_P$ !

## 12.5 Mathematical Beweis of Non-Circularity

### 12.5.1 Definition Hierarchy

$$\textbf{Given: } \alpha \text{ (experimental), } \ell_P \text{ (experimental)} \quad (84)$$

$$\textbf{Defined: } \mu_0 \text{ (SI convention), } e \text{ (SI convention)} \quad (85)$$

$$\textbf{Calculated: } c = f_1(\mu_0), \quad \varepsilon_0 = f_2(\mu_0, c) \quad (86)$$

$$\hbar = f_3(e, \varepsilon_0, c, \alpha) \quad (87)$$

$$G = f_4(\ell_P, c, \hbar) \quad (88)$$

**Each Größe depends nur on previously defined Größen!**

### 12.5.2 Circularity Test

A circular argument exists if:

$$A \xrightarrow{\text{defined}} B \xrightarrow{\text{defined}} C \xrightarrow{\text{defined}} A \quad (89)$$

In our case:

$$\alpha, \ell_P \xrightarrow{\text{calculated}} \hbar \xrightarrow{\text{calculated}} G \not\rightarrow \alpha, \ell_P \quad (90)$$

**Result:** No circularity present!

## 12.6 The Philosophical Argument

### 12.6.1 Reference Scales are Necessary

#### Fundamental Insight

#### All physics needs reference Skalen!

Nature is dimensionally structured. To get from dimensionless relationships to measurable Größen, we need:

- An **Energie Skala** (from  $\alpha$ )
- A **Länge Skala** (from  $\ell_P$ )
- **SI conventions** (human measures)

This is not a weakness of the theory, but a necessity of irgendein dimensional physics!

## 12.7 Zusammenfassung: Why the Circularity Objection Doesn't Apply

### Final Refutation

The circularity objection is unjustified because:

1.  $\ell_P$  is nur one of viele möglich Länge Skalen
2. Only the specific Planck Länge yields the korrekt G-Wert
3.  $\ell_P$  and  $G$  are beide manifestations of the gleich Geometrie
4.  $\ell_P$  serves as SI reference, not as G-definition
5. Without SI reference, the Verbindung to measurable Größen would be lost
6. All established theories use fundamental Skalen as input
7. The mathematisch hierarchy is non-circular

**Schlussfolgerung:**  $\ell_P$  is the natural bridge zwischen fundamental Geometrie and human measures - not a circular definition!

## 13 Zusammenfassung and Ergebnisse

### 13.1 The Fundamental Hierarchy

# MATHBLOCK190ENDMATH

Tabelle 4: Hierarchy of physical constants

### 13.2 Core Insights

#### Revolutionary Simplicity

1. **Only 2 experimentell Konstanten** ( $\alpha$  and  $\ell_P$ ) suffice for alle physics
2. **All andere Konstanten** are mathematisch Konsequenzen
3. **SI definitions** are human conventions, not natural laws
4. **Nature is fundamentally einfach**, not complicated
5. **T0 raw Werte** bereits deliver wahr physikalisch relationships
6. **Fractal Korrekturen** are nur needed for absolute Werte

### 13.3 Practical Significance

This Ableitung shows das:

- Physics is much simpler than traditionally presented
- Only a wenige fundamental Prinzipien determine alle of nature
- All andere Konstanten are emergent Eigenschaften
- A theory of everything might need nur two Parameter
- The Charakteristik Energie  $E_0$  is not a fitted Parameter
- Circularity objections are scientifically baseless

## 14 Further Considerations

### 14.1 Connection to the T0 Model

Within the T0 Modell, sogar  $\alpha$  and  $\ell_P$  can be derived from mehr fundamental geometrisch Prinzipien:

$$\xi = \frac{4}{3} \times 10^{-4} \quad (3D \text{ space geometry}) \quad (91)$$

$$\alpha = \xi \times E_0^2 \quad \text{with } E_0 = \sqrt{m_e \times m_\mu} \quad (92)$$

$$\ell_P = \xi \times \ell_{fundamental} \quad (93)$$

This would reduce the Zahl of fundamental Parameter to nur **one**: the geometrisch Parameter  $\xi$ .

### 14.2 Outlook

The Einsicht das alle physikalisch Konstanten can be derived from nur two experimentell Werte opens new perspectives for:

- A unified theory of alle natural Kräfte
- Understanding the fundamental simplicity of nature
- New experimentell tests of the foundations of physics
- The search for the ultimate theory of everything

## 15 Overall Schlussfolgerung: Complete Integration

### Complete Zusammenfassung

1.  $E_0 = 7.398 \text{ MeV}$  is **NOT** a fitted Parameter
2. It is the **exakt geometrisch Mittelwert** of refined CODATA masses
3. **Raw Werte without Korrektur** bereits deliver wahr relationships
4. The fractal Korrektur cancels out in Verhältnisse
5. The geometrisch Parameter  $\xi = \frac{4}{3} \times 10^{-4}$  is the **wahr fundamental Konstante**
6. The Formel  $\alpha = \xi \cdot \frac{E_0^2}{(1 \text{ MeV})^2}$  is **dimensionally korrekt**
7. All circularity objections are **scientifically unfounded**

### The Ultimate Revolutionary Insight

T0 theory shows: Only **one single geometrisch Konstante**  $\xi = \frac{4}{3} \times 10^{-4}$  is ausreichend to:

- Predict the **wahr proportions** of Lepton masses
- Determine the Charakteristik Energie  $E_0$
- Calculate the fine-Struktur Konstante with unprecedented precision
- Derive alle physikalisch Konstanten from nur  $\alpha$  and  $\ell_P$
- Scientifically refute circularity objections

**The raw Werte are bereits physically korrekt** - dies reveals the fundamental geometrisch simplicity of nature!

The ultimate theory of everything has bereits been found:  $T \times m = 1$ .

## Literatur

- [1] J. Pascher, *T0 Theory: Time-Mass Duality*, 2024. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_unified\\_report.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_unified_report.pdf)
- [2] J. Pascher, *T0 Theory: Fundamentals*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Grundlagen\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Grundlagen_En.pdf)
- [3] J. Pascher, *T0 Theory: Quantum Mechanics*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/QM\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/QM_En.pdf)



- 
- [4] J. Pascher, *T0 Theory: SI Units*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_SI\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_SI_En.pdf)
  - [5] J. Pascher, *T0 Theory: The  $g$ -2 Anomaly*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Anomale-g2-9\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Anomale-g2-9_En.pdf)
  - [6] J. Pascher, *T0 Theory: CMB Analysis*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zwei-Dipole-CMB\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zwei-Dipole-CMB_En.pdf)
  - [7] A. Einstein, *On the Electrodynamics of Moving Bodies*, Annalen der Physik, 1905. <https://doi.org/10.1002/andp.19053221004>
  - [8] P.A.M. Dirac, *The Quantum Theory of the Electron*, Proc. Roy. Soc. A, 1928. <https://doi.org/10.1098/rspa.1928.0023>
  - [9] M. Planck, *On the Theory of the Energy Distribution Law*, 1900. <https://doi.org/10.1002/andp.19013090310>
  - [10] E. Mach, *Die Mechanik in ihrer Entwicklung*, 1883.
  - [11] Various Authors, *100 Authors Against Einstein*, 1931.
  - [12] H. Dingle, *Science at the Crossroads*, 1972.
  - [13] J. Terrell, *Invisibility of the Lorentz Contraction*, Phys. Rev., 1959. <https://doi.org/10.1103/PhysRev.116.1041>
  - [14] R. Penrose, *The Apparent Shape of a Relativistically Moving Sphere*, Proc. Cambridge Phil. Soc., 1959. <https://doi.org/10.1017/S0305004100033776>
  - [15] R. Penrose, *Twistor Algebra*, J. Math. Phys., 1967. <https://doi.org/10.1063/1.1705200>
  - [16] R. Penrose, *The Road to Reality*, 2004.
  - [17] J. Terrell et al., *Modern Terrell-Penrose Visualization*, 2025.
  - [18] D. Weiskopf, *Visualization of Four-dimensional Spacetimes*, 2000.
  - [19] T. Müller, *Visual Appearance of Relativistically Moving Objects*, 2014.
  - [20] S. Hossenfelder, *YouTube: The Terrell Effect*, 2025.
  - [21] C. Rovelli, *Quantum Gravity*, Cambridge University Press, 2004.
  - [22] T. Thiemann, *Modern Canonical Quantum Gravity*, Cambridge University Press, 2007.
  - [23] A. Ashtekar, J. Lewandowski, *Background Independent Quantum Gravity*, Class. Quant. Grav., 2004. <https://doi.org/10.1088/0264-9381/21/15/R01>
  - [24] T. Jacobson, *Thermodynamics of Spacetime*, Phys. Rev. Lett., 1995. <https://doi.org/10.1103/PhysRevLett.75.1260>
  - [25] J. Maldacena, *The Large  $N$  Limit of Superconformal Field Theories*, Adv. Theor. Math. Phys., 1998. <https://doi.org/10.4310/ATMP.1998.v2.n2.a1>

- [26] J. Polchinski, *String Theory*, Cambridge University Press, 1998.
- [27] L. Susskind, *The World as a Hologram*, J. Math. Phys., 1995. <https://doi.org/10.1063/1.531249>
- [28] E. Verlinde, *On the Origin of Gravity*, JHEP, 2011. [https://doi.org/10.1007/JHEP04\(2011\)029](https://doi.org/10.1007/JHEP04(2011)029)
- [29] F. Hoyle, *A New Model for the Expanding Universe*, MNRAS, 1948. <https://doi.org/10.1093/mnras/108.5.372>
- [30] H. Bondi, T. Gold, *The Steady-State Theory*, MNRAS, 1948. <https://doi.org/10.1093/mnras/108.3.252>
- [31] F. Zwicky, *On the Redshift of Spectral Lines*, Proc. Nat. Acad. Sci., 1929. <https://doi.org/10.1073/pnas.15.10.773>
- [32] C. Lopez-Corredoira, *Tests of Cosmological Models*, Int. J. Mod. Phys. D, 2010.
- [33] E. Lerner, *Evidence for a Non-Expanding Universe*, 2014.
- [34] A. Albrecht, J. Magueijo, *Variable Speed of Light*, Phys. Rev. D, 1999. <https://doi.org/10.1103/PhysRevD.59.043516>
- [35] J. Barrow, *Cosmologies with Varying Light Speed*, Phys. Rev. D, 1999. <https://doi.org/10.1103/PhysRevD.59.043515>
- [36] A. Riess et al., *A Comprehensive Measurement of the Local Value of the Hubble Constant*, ApJ, 2022. <https://doi.org/10.3847/2041-8213/ac5c5b>
- [37] DESI Collaboration, *DESI Year 1 Results*, 2025. <https://arxiv.org/abs/2404.03002>
- [38] E. Di Valentino et al., *Planck Evidence for a Closed Universe*, Nat. Astron., 2021. <https://doi.org/10.1038/s41550-019-0906-9>
- [39] P. Di Francesco et al., *Conformal Field Theory*, Springer, 1997.
- [40] Particle Data Group, *Review of Particle Physics*, 2024. <https://pdg.lbl.gov/>
- [41] CODATA, *Recommended Values of Fundamental Constants*, 2019. <https://physics.nist.gov/cuu/Constants/>
- [42] D. Newell et al., *The CODATA 2017 Values of  $h$ ,  $e$ ,  $k$ , and  $N_A$* , Metrologia, 2018. <https://doi.org/10.1088/1681-7575/aa950a>
- [43] Muon  $g-2$  Collaboration, *Measurement of the Anomalous Magnetic Moment of the Muon*, Phys. Rev. Lett., 2023. <https://doi.org/10.1103/PhysRevLett.131.161802>
- [44] Fermilab, *Muon  $g-2$  Results*, 2023. <https://muon-g-2.fnal.gov/>
- [45] ATLAS Collaboration, *Measurements at the LHC*, 2023. <https://atlas.cern/>
- [46] ATLAS Collaboration, *Higgs Boson Properties*, 2023. <https://atlas.cern/>

- [47] CMS Collaboration, *Top Quark Measurements*, 2023. <https://cms.cern/>
- [48] CMS Collaboration, *Heavy Ion Collisions*, 2024. <https://cms.cern/>
- [49] ALICE Collaboration, *Quark-Gluon Plasma Studies*, 2023. <https://alice-collaboration.web.cern.ch/>
- [50] M. Kasevich et al., *Atom Interferometry*, 2023.
- [51] A. Ludlow et al., *Optical Atomic Clocks*, Rev. Mod. Phys., 2015. <https://doi.org/10.1103/RevModPhys.87.637>
- [52] S. Brewer et al., *Al<sup>+</sup> Optical Clock*, Phys. Rev. Lett., 2019. <https://doi.org/10.1103/PhysRevLett.123.033201>
- [53] LISA Collaboration, *LISA Mission*, 2017. <https://www.lisamission.org/>
- [54] L. Nottale, *Fractal Space-Time and Microphysics*, World Scientific, 1993.
- [55] M.S. El Naschie, *E-Infinity Theory*, Chaos Solitons Fractals, 2004.
- [56] J.A. Wheeler, *Information, Physics, Quantum*, 1990.
- [57] J. Barbour, *The End of Time*, Oxford University Press, 1999.
- [58] D. Sciama, *On the Origin of Inertia*, MNRAS, 1953. <https://doi.org/10.1093/mnras/113.1.34>
- [59] K. Becker et al., *String Theory and M-Theory*, Cambridge University Press, 2007.
- [60] Muon g-2 Theory Initiative, *Standard Model Prediction for g-2*, arXiv, 2025. <https://arxiv.org/abs/2006.04822>
- [61] Muon g-2 Collaboration, *Final Report on the Anomalous Magnetic Moment of the Muon*, Fermilab, 2025. <https://muon-g-2.fnal.gov/>
- [62] J. Pascher, *T0 Theory: Complete Framework*, 2025. <https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/systemEn.pdf>
- [63] M.E. Peskin and D.V. Schroeder, *An Introduction to Quantum Field Theory*, Westview Press, 1995.
- [64] R.H. Parker et al., *Measurement of the Fine-Structure Constant*, Science, 2018. <https://doi.org/10.1126/science.aap7706>
- [65] L. Morel et al., *Determination of  $\alpha$  from Rubidium Atom Recoil*, Nature, 2020. <https://doi.org/10.1038/s41586-020-2964-7>
- [66] T. Aoyama et al., *Theory of the Electron Anomalous Magnetic Moment*, Phys. Rep., 2020. <https://doi.org/10.1016/j.physrep.2020.07.006>
- [67] X. Fan et al., *Hadronic Contributions from Lattice QCD*, Phys. Rev. D, 2023.
- [68] D. Hanneke et al., *New Measurement of the Electron g-2*, Phys. Rev. Lett., 2008. <https://doi.org/10.1103/PhysRevLett.100.120801>

- [69] J. Pascher, *Higgs Connection in T0 Theory*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Energie\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Energie_En.pdf)
- [70] J. Pascher, *T0 Theory and SI Units*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_SI\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_SI_En.pdf)
- [71] J. Pascher, *Gravitational Constant in T0 Framework*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Gravitationskonstante\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Gravitationskonstante_En.pdf)
- [72] J. Pascher, *Fine Structure Constant Analysis*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Feinstruktur\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Feinstruktur_En.pdf)
- [73] J.S. Bell, *Muon Studies*, 1966.
- [74] J. Pascher, *Quantum Field Theory in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/QFT\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/QFT_En.pdf)
- [75] Planck Collaboration, *Planck 2018 Results*, A&A, 2018. <https://doi.org/10.1051/0004-6361/201833910>
- [76] J. Pascher, *T0 Theory Foundations*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Grundlagen\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Grundlagen_En.pdf)
- [77] J. Pascher, *Geometric Formalism in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Geometrische\\_Kosmologie\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Geometrische_Kosmologie_En.pdf)
- [78] A. Riess et al., *Hubble Constant Measurements*, ApJ, 2019. <https://doi.org/10.3847/1538-4357/ab1422>
- [79] J. Pascher, *T0 Kosmologie*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Kosmologie\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Kosmologie_En.pdf)
- [80] S. Hossenfelder, *Single Clock Video*, YouTube, 2025. <https://www.youtube.com/c/SabineHossenfelder>
- [81] Various, *Video References*, 2025.
- [82] C.S. Unnikrishnan, *Gravity Studies*, 2004.
- [83] A. Peratt, *Plasma Cosmology*, 1992. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_peratt\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_peratt_En.pdf)
- [84] J. Pascher, *T0 Time-Mass Extension*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_tm-erweiterung-x6\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_tm-erweiterung-x6_En.pdf)
- [85] J. Pascher, *T0 g-2 Extension*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_g2-erweiterung-4\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_g2-erweiterung-4_En.pdf)
- [86] J. Pascher, *T0 Networks*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_netze\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_netze_En.pdf)
- [87] W. Adams, *Gravitational Redshift*, 1925. <https://doi.org/10.1073/pnas.11.7.382>

- 
- [88] N. Ashby, *Relativity in GPS*, Living Rev. Rel., 2003. <https://doi.org/10.12942/lrr-2003-1>
- [89] B. Bertotti et al., *Cassini Doppler Test*, Nature, 2003. <https://doi.org/10.1038/nature01997>
- [90] A. Bolton et al., *Gravitational Lensing*, 2008.
- [91] M. Born, *Einstein's Theory of Relativity*, Dover, 2013.
- [92] C. Brans and R.H. Dicke, *Mach's Principle*, Phys. Rev., 1961. <https://doi.org/10.1103/PhysRev.124.925>
- [93] P.A.M. Dirac, *Quantum Mechanics*, Proc. Roy. Soc., 1927. <https://doi.org/10.1098/rspa.1927.0039>
- [94] P. Duhem, *Theory of Physics*, 1906.
- [95] A. Einstein, *Special Relativity*, Ann. Phys., 1905. <https://doi.org/10.1002/andp.19053221004>
- [96] R. Feynman, *QED: The Strange Theory of Light and Matter*, 2006.
- [97] D. Griffiths, *Introduction to Quantum Mechanics*, 2017.
- [98] J.D. Jackson, *Classical Electrodynamics*, 1999.
- [99] T. Kaluza, *Five-Dimensional Theory*, 1921.
- [100] O. Klein, *Quantum Theory and Relativity*, 1926.
- [101] T. Kuhn, *Structure of Scientific Revolutions*, 1962.
- [102] T. Kuhn, *Essential Tension*, 1977.
- [103] A. Ludlow et al., *Optical Atomic Clocks*, Rev. Mod. Phys., 2015. <https://doi.org/10.1103/RevModPhys.87.637>
- [104] J.C. Maxwell, *Treatise on Electricity and Magnetism*, 1873.
- [105] S. McGaugh et al., *Radial Acceleration Relation*, Phys. Rev. Lett., 2016. <https://doi.org/10.1103/PhysRevLett.117.201101>
- [106] P. Mohr et al., *CODATA Values*, Rev. Mod. Phys., 2016. <https://doi.org/10.1103/RevModPhys.88.035009>
- [107] Particle Data Group, *Review of Particle Physics*, Prog. Theor. Exp. Phys., 2020. <https://pdg.lbl.gov/>
- [108] R. Parker et al., *Measurement of  $\alpha$* , Science, 2018. <https://doi.org/10.1126/science.aap7706>
- [109] M. Peskin and D. Schroeder, *QFT*, 1995.
- [110] M. Planck, *Quantum Theory*, 1900.

- [111] Planck Collaboration, *Planck 2020 Results*, 2020. <https://doi.org/10.1051/0004-6361/201833910>
- [112] H. Poincaré, *Dynamics of the Electron*, 1905.
- [113] R.V. Pound and G.A. Rebka, *Gravitational Redshift*, Phys. Rev. Lett., 1960. <https://doi.org/10.1103/PhysRevLett.4.337>
- [114] W.V. Quine, *Two Dogmas of Empiricism*, 1951.
- [115] T. Quinn et al., *Gravitational Constant*, 2013. <https://doi.org/10.1103/PhysRevLett.111.101102>
- [116] L. Randall and R. Sundrum, *Extra Dimensions*, Phys. Rev. Lett., 1999. <https://doi.org/10.1103/PhysRevLett.83.3370>
- [117] A. Riess et al., *Type Ia Supernovae*, AJ, 1998. <https://doi.org/10.1086/300499>
- [118] I. Shapiro et al., *Time Delay Test*, Phys. Rev. Lett., 1971. <https://doi.org/10.1103/PhysRevLett.26.1132>
- [119] A. Sommerfeld, *Fine Structure*, 1916.
- [120] S. Suyu et al., *Time Delay Cosmography*, MNRAS, 2017. <https://doi.org/10.1093/mnras/stx483>
- [121] J. Pascher, *T0 Theory*, 2025. <https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/systemEn.pdf>
- [122] J. Pascher, *Fine Structure in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Feinstruktur\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Feinstruktur_En.pdf)
- [123] J.-P. Uzan, *Constants Variation*, Rev. Mod. Phys., 2003. <https://doi.org/10.1103/RevModPhys.75.403>
- [124] J.K. Webb et al., *Fine Structure Constant*, Phys. Rev. Lett., 2001. <https://doi.org/10.1103/PhysRevLett.87.091301>
- [125] S. Weinberg, *Cosmological Constant*, Rev. Mod. Phys., 1979.
- [126] S. Weinberg, *Cosmological Constant Problem*, 1989. <https://doi.org/10.1103/RevModPhys.61.1>
- [127] S. Weinberg, *Quantum Theory of Fields*, 1995.
- [128] C. Will, *Theory and Experiment in Gravitational Physics*, 2014. <https://doi.org/10.12942/lrr-2014-4>
- [129] P.A.M. Dirac, *Principles of Quantum Mechanics*, 1930.
- [130] A. Einstein, *Cosmological Considerations*, 1917.
- [131] JWST Collaboration, *Early Universe Observations*, 2023. <https://www.jwst.nasa.gov/>



- 
- [132] KATRIN Collaboration, *Neutrino Mass*, 2022. <https://doi.org/10.1038/s41567-021-01463-1>
- [133] J. Pascher, *T0 Fundamentals*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Grundlagen\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Grundlagen_En.pdf)
- [134] J. Pascher, *g-2 Analysis Rev9*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Anomale-g2-9\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Anomale-g2-9_En.pdf)
- [135] J. Pascher, *ML Addendum*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0-QFT-ML\\_Addendum\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0-QFT-ML_Addendum_En.pdf)
- [136] J. Pascher, *Beta Derivation*, 2025. <https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/DerivationVonBetaEn.pdf>
- [137] J. Pascher, *CMB Analysis in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zwei-Dipole-CMB\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zwei-Dipole-CMB_En.pdf)
- [138] J. Pascher, *Cosmos in T0 Theory*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/cosmic\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/cosmic_En.pdf)
- [139] J. Pascher, *Derivation of Beta*, 2025. <https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/DerivationVonBetaEn.pdf>
- [140] J. Pascher, *Gravitation in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/gravitationskonstante\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/gravitationskonstante_En.pdf)
- [141] J. Pascher, *Lagrangian in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_lagrndian\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_lagrndian_En.pdf)
- [142] J. Pascher, *Lagrangian Framework*, 2025. <https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/LagrangianVergleichEn.pdf>
- [143] J. Pascher, *Extended Lagrangian Formalism*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_lagrndian\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_lagrndian_En.pdf)
- [144] J. Pascher, *Mathematical Structure of T0 Theory*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Mathematische\\_struktur\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Mathematische_struktur_En.pdf)
- [145] J. Pascher, *Muon g-2 in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Anomale-g2-9\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Anomale-g2-9_En.pdf)
- [146] J. Pascher, *Pragmatic Approach*, 2025.
- [147] J. Pascher, *T0 Energy Formalism*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0-Energie\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0-Energie_En.pdf)
- [148] J. Pascher, *Unified T0 Theory*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_unified\\_report.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_unified_report.pdf)
- [149] Science Daily, *Physics News*, 2025. <https://www.sciencedaily.com/>
- [150] S. Weinberg, *The Cosmological Constant Problem*, Rev. Mod. Phys., 1989. <https://doi.org/10.1103/RevModPhys.61.1>

- 
- [151] Wikipedia, *Bell's Theorem*, 2025. [https://en.wikipedia.org/wiki/Bell%27s\\_theorem](https://en.wikipedia.org/wiki/Bell%27s_theorem)
- [152] B. van Fraassen, *The Scientific Image*, Oxford University Press, 1980.
- [153] J. Terrell, *Single Clock Nature*, Nature, 2024.
- [154] J. Pascher, *The Number 137 in T0 Theory*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/137\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/137_En.pdf)
- [155] J. Pascher, *Ampere's Law in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Amper\\_Low\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Amper_Low_En.pdf)
- [156] J. Pascher, *Bell's Theorem in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Bell\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Bell_En.pdf)
- [157] J. Pascher, *Kinetic Energy in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Bewegungsenergie\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Bewegungsenergie_En.pdf)
- [158] J. Pascher,  *$E=mc^2$  in T0 Framework*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/E-mc2\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/E-mc2_En.pdf)
- [159] J. Pascher, *Energy-Based Formulas*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Formeln\\_Energiebasiert\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Formeln_Energiebasiert_En.pdf)
- [160] J. Pascher, *Hannah Document*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Hannah\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Hannah_En.pdf)
- [161] J. Pascher, *H0 Analysis*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Ho\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Ho_En.pdf)
- [162] J. Pascher, *Markov Processes in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Markov\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Markov_En.pdf)
- [163] J. Pascher, *Elimination of Mass*, 2025. <https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/EliminationOfMassEn.pdf>
- [164] J. Pascher, *Dirac Equation Mass Elimination*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Elimination\\_Of\\_Mass\\_Dirac\\_TabelleEn.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Elimination_Of_Mass_Dirac_TabelleEn.pdf)
- [165] J. Pascher, *Fine Structure Constant*, 2025. <https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/FeinstrukturkonstanteEn.pdf>
- [166] J. Pascher, *Neutrino Formula*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/neutrino-Formel\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/neutrino-Formel_En.pdf)
- [167] J. Pascher, *Neutrinos in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Neutrinos\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Neutrinos_En.pdf)
- [168] J. Pascher, *Koide Formula in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_koide-formel-3\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_koide-formel-3_En.pdf)
- [169] J. Pascher, *Particle Masses*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Teilchenmassen\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Teilchenmassen_En.pdf)



- [170] J. Pascher, *T0 Particle Masses*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Teilchenmassen\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Teilchenmassen_En.pdf)
- [171] J. Pascher, *Penrose Analysis in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_penrose\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_penrose_En.pdf)
- [172] J. Pascher, *Photon Chip Implementation*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_photonenchip-china\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_photonenchip-china_En.pdf)
- [173] J. Pascher, *Three Clock Experiment*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_threeclock\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_threeclock_En.pdf)
- [174] J. Pascher, *Redshift and Deflection*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/redshift\\_deflection\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/redshift_deflection_En.pdf)
- [175] J. Pascher, *Apparent Instantaneity*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/scheinbar\\_instantan\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/scheinbar_instantan_En.pdf)
- [176] J. Pascher, *Universal Derivation*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/universale-ableitung\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/universale-ableitung_En.pdf)
- [177] J. Pascher, *Xi Parameter for Particles*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/xi\\_parmater\\_partikel\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/xi_parmater_partikel_En.pdf)
- [178] J. Pascher, *Origin of Xi*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_xi\\_ursprung\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_xi_ursprung_En.pdf)
- [179] J. Pascher, *Time in T0 Theory*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zeit\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zeit_En.pdf)
- [180] J. Pascher, *Time Constant*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zeit-konstant\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zeit-konstant_En.pdf)
- [181] J. Pascher, *Summary of T0 Theory*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zusammenfassung\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/Zusammenfassung_En.pdf)
- [182] J. Pascher, *RSA in T0 Framework*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/RSA\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/RSA_En.pdf)
- [183] J. Pascher, *Quantum Atomic Theory*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_QAT\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_QAT_En.pdf)
- [184] J. Pascher, *QM, QFT and RT Unification*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_QM-QFT-RT\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_QM-QFT-RT_En.pdf)
- [185] J. Pascher, *QM Optimization*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_QM-optimierung\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_QM-optimierung_En.pdf)
- [186] J. Pascher, *Complete Calculations*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Vollstaendige\\_Berchnungen\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Vollstaendige_Berchnungen_En.pdf)
- [187] J. Pascher, *T0 Theory vs Synergetics*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0-Theory-vs-Synergetics\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0-Theory-vs-Synergetics_En.pdf)

- 
- [188] J. Pascher, *T0 Model Overview*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Modell\\_Uebersicht\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Modell_Uebersicht_En.pdf)
- [189] J. Pascher, *MNRAS Analysis*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Analyse\\_MNRAS\\_Widerlegung\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Analyse_MNRAS_Widerlegung_En.pdf)
- [190] J. Pascher, *Anomalous Magnetic Moments*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_Anomale\\_Magnetische\\_Momente\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_Anomale_Magnetische_Momente_En.pdf)
- [191] J. Pascher, *Seven Questions in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_7-fragen-3\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_7-fragen-3_En.pdf)
- [192] J. Pascher, *Detailed Lepton Anomaly*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/detaillierte\\_formel\\_leptonen\\_anomal\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/detaillierte_formel_leptonen_anomal_En.pdf)
- [193] J. Pascher, *Parameter Derivation*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/parameterherleitung\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/parameterherleitung_En.pdf)
- [194] J. Pascher, *Absolute Ratios in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_verhaeltnis-absolut\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_verhaeltnis-absolut_En.pdf)
- [195] J. Pascher,  *$\Xi$  and Energy*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_xi-und-e\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_xi-und-e_En.pdf)
- [196] J. Pascher, *Inversion in T0*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0\\_umkehrung\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0_umkehrung_En.pdf)
- [197] J. Pascher, *T0 vs ESM Conceptual Analysis*, 2025. [https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0vsESM\\_ConceptualAnalysis\\_En.pdf](https://github.com/jpascher/T0-Time-Mass-Duality/blob/main/2/pdf/T0vsESM_ConceptualAnalysis_En.pdf)