Die Gravitationskonstante in der T0-Theorie

Johann Pascher

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Kapitel 1

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Zusammenfassung

Die Gravitationskonstante G ist eine der fundamentalen Naturkonstanten, deren Wert im Standardmodell der Physik als freier Parameter behandelt wird. Die T0-Theorie bietet eine geometrische Herleitung von G aus dem fundamentalen Parameter $\xi = \frac{4}{3} \times 10^{-4}$, was die Anzahl der freien Parameter in der Physik weiter reduziert.

1.1 Die Rolle der Gravitationskonstante

1.1.1 Experimentelle Bestimmung

Die Newton'sche Gravitationskonstante ist:

$$G = 6,67430(15) \times 10^{-11}\,\mathrm{m^3 kg^{-1} s^{-2}} \tag{1.1}$$

Sie ist die am ungenauesten bekannte Naturkonstante – trotz jahrhundertelanger Messungen.

1.1.2 Das Problem der Willkürlichkeit

Im Standardrahmen der Physik ist G ein freier Parameter ohne theoretische Erklärung für seinen spezifischen Wert. Dies ist unbefriedigend für eine fundamentale Theorie.

1.2 T0-Herleitung der Gravitationskonstante

1.2.1 Verbindung zum ξ-Parameter

In der T0-Theorie ist die Gravitationskonstante mit dem fundamentalen Parameter ξ verknüpft:

T0-Formel für die Gravitationskonstante

$$\boxed{G = \frac{\hbar c}{m_P^2} = f(\xi)} \tag{1.2}$$

wobei m_P die Planck-Masse ist und durch ξ bestimmt wird:

$$m_P = \frac{1}{\sqrt{\xi}} \cdot m_0 \tag{1.3}$$

1.2.2 Dimensionsanalyse

In natürlichen Einheiten ($c = \hbar = 1$) vereinfacht sich die Beziehung zu:

$$G = \frac{1}{m_P^2} = \xi \cdot E_0^{-2} \tag{1.4}$$

wobei E_0 eine charakteristische Energieskala der Theorie ist.

1.3 Implikationen für die Gravitation

1.3.1 Einheitliche Beschreibung

Die T0-Herleitung von G hat weitreichende Konsequenzen:

1. **Reduktion freier Parameter**: G ist keine freie Konstante mehr, sondern folgt aus ξ

2. **Verbindung zur Quantenmechanik**: Die geometrische Herleitung verbindet Gravitation und Quantenphysik

3. **Vorhersagekraft**: Die Theorie macht testbare Vorhersagen für gravitative Phänomene

1.3.2 Schwache Gravitationskraft

Die extreme Schwäche der Gravitation im Vergleich zu anderen Kräften erklärt sich durch:

$$\frac{G \cdot m_p^2}{\hbar c} \approx 10^{-38} \tag{1.5}$$

In der T0-Theorie folgt dies natürlich aus der Hierarchie der ξ-Potenzen.

Warum ist die Gravitation so schwach?

Die T0-Theorie erklärt die Schwäche der Gravitation als Konsequenz der geometrischen Struktur der Raumzeit. Der kleine Wert von $\xi \approx 10^{-4}$ führt durch Potenzierung zu den extremen Hierarchien zwischen den Naturkräften.

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