

# Improved Equation Rendering Test

## Testing Improved Equation Rendering

This document tests the improved rendering of complex mathematical equations in LaTeX and PDF output.

### *Einstein Field Equations*

The Einstein field equations relate the geometry of spacetime to the distribution of matter within it.

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = 8\pi G/c^4 T_{\mu\nu}$$

Original LaTeX:

```
G_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}
```

### *Schrödinger Equation*

The Schrödinger equation describes how the quantum state of a physical system changes over time.

$$i\hbar\partial_t\Psi(\mathbf{r},t) = \hat{H}\Psi(\mathbf{r},t)$$

Original LaTeX:

```
i\hbar\frac{\partial}{\partial t}\Psi(\mathbf{r},t) = \hat{H}\Psi(\mathbf{r},t)
```

### *Maxwell's Equations*

Maxwell's equations describe how electric and magnetic fields are generated by charges, currents, and changes of each other.

$$\begin{aligned}\nabla \cdot \mathbf{E} &= \rho/\epsilon_0 & \nabla \cdot \mathbf{B} &= 0 & \nabla \times \mathbf{E} &= -\partial\mathbf{B}/\partial t & \nabla \times \mathbf{B} &= \mu_0\mathbf{J} + \mu_0\epsilon_0\partial\mathbf{E}/\partial t\end{aligned}$$

Original LaTeX:

```
\begin{align} \nabla \cdot \mathbf{E} &= \frac{\rho}{\epsilon_0} & \nabla \cdot \mathbf{B} &= 0 & \nabla \times \mathbf{E} &= -\frac{\partial \mathbf{B}}{\partial t} & \nabla \times \mathbf{B} &= \mu_0 \mathbf{J} + \mu_0 \epsilon_0 \frac{\partial \mathbf{E}}{\partial t} \end{align}
```

### *Dirac Equation*

The Dirac equation is a relativistic wave equation that describes the behavior of fermions.

$$(i\gamma^\mu \partial_\mu - m)\psi = 0$$

Original LaTeX:

$$(i\gamma^\mu \partial_\mu - m)\psi = 0$$

## ***Path Integral Formulation***

The path integral formulation of quantum mechanics describes the amplitude for a particle to travel from one point to another as a sum over all possible paths.

$$\langle q_f, t_f | q_i, t_i \rangle = \int_{q(t_i)=q_i}^{q(t_f)=q_f} \mathcal{D}q(t) \exp\left(\frac{i}{\hbar} S[q]\right)$$

Original LaTeX:

$$\langle q_f, t_f | q_i, t_i \rangle = \int_{q(t_i)=q_i}^{q(t_f)=q_f} \mathcal{D}q(t) \exp\left(\frac{i}{\hbar} S[q]\right)$$