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December 22, 2025

Clay Mathematics Institute
Millennium Prize Committee
70 Main Street, Suite 300
Peterborough, NH 03458
United States

To the Millennium Prize Committee,

RE: Submission of UIDT v3.6.1 – A Constructive Physical Mechanism for the Yang-Mills Mass Gap

I hereby submit the manuscript *"Unified Information-Density Theory (UIDT) v3.6.1: Vacuum Information-Density as the Fundamental Geometric Scalar"* for your consideration.

This submission presents a theoretical framework that derives the Yang-Mills mass gap through a specific physical mechanism: the non-minimal coupling of gauge fields to a vacuum information density scalar $S(x)$. While I acknowledge the strict constraints of the Millennium Problem regarding pure gauge theory, UIDT offers a constructive solution to the physical mass generation problem that is mathematically self-consistent and experimentally predictive.

Important Version Notice: This document (v3.6.1) supersedes all previous iterations. Specifically, version 3.3 has been permanently withdrawn due to external formatting errors. This version represents the clean, author-controlled, and definitive implementation of the theory.

Core Scientific Results

The framework establishes a "Three-Pillar Architecture" connecting vacuum geometry with quantum chromodynamics:

- **Analytical Mass Gap:** The theory derives the mass gap Δ without free parameters, yielding:

$$\Delta = 1.710 \pm 0.015 \text{ GeV}$$

  This result is in strict agreement with Lattice QCD glueball estimates (1710 ± 80 MeV).
- **The Gamma Invariant:** A fundamental scaling factor $\gamma = 16.339$ is derived from the self-consistent closure of the vacuum equations (Category A).
- **Corrected Evidence Classification:** In the interest of strict scientific integrity, previous claims regarding Casimir force anomalies have been corrected. The predicted deviation ($+0.59\%$ at 0.66 nm) is now explicitly classified as an *unverified prediction* (Category D), awaiting future experimental testing.

Mathematical Consistency

The proposed mechanism is supported by:

1. **Numerical Closure:** The system of three coupled equations converges with residuals of order $\mathcal{O}(10^{-14})$.

2. **Geometric Unification:** The theory provides a geometric basis for the mass term via the scalar vacuum expectation value.

I declare no conflicts of interest and affirm the independent nature of this derivation.

Respectfully submitted,

Philipp Rietz

Enclosures:

- UIDT v3.6.1 Complete Manuscript (DOI: 10.5281/zenodo.17835200)
- Numerical Consistency Report