UNITED STATES PATENT APPLICATION

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TITLE:

INVERSE TOPOLOGICAL DECODING VIA DERIVED HAMILTONIANS WITH BLOCKCHAIN-MEDIATED MARKET-BASED ROYALTIES

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention pertains to the fields of **quantum computing, quantum error correction, and digital ledger-based intellectual property tracking**. It introduces a novel approach to enforcing **error-resilient quantum evolution** via **inverse topological decoding** and **Derived Hamiltonians**. Additionally, the invention incorporates **blockchain-based tracking and royalty schemas** for commercialization and licensing of quantum error correction protocols.

Description of Related Art

Conventional quantum error correction (QEC) relies on **reactive** methods such as syndrome measurement and active correction. These methods often result in high hardware overhead and significant operational inefficiencies. The **inverse topological decoding approach** proposed in this invention **preemptively enforces fault tolerance by embedding the correct quantum state into the system's fundamental Hamiltonian**, thereby minimizing the need for external error correction interventions.

SUMMARY OF THE INVENTION

This invention defines a **market-based approach to monetizing quantum error correction patents** by integrating:

1. **Inverse Topological Decoding**: A Hamiltonian design principle that dynamically constrains quantum state evolution within an error-resilient manifold.
2. **Derived Hamiltonians**: Mathematically constructed to proactively guide qubit states toward the final, desired logical space.

3. **Blockchain-Tokenized Royalties**: Implementing a **digital asset-based licensing system** that enforces fractional market-based royalties on quantum computing firms deploying this technology.

4. **Empirical Validation Framework**: This is a **highly theoretical** construct that necessitates **experimental verification** in superconducting, Majorana-based, and spin-qubit quantum architectures.

By combining **advanced quantum error suppression techniques** with **decentralized enforcement mechanisms**, this invention ensures secure, transparent, and scalable commercialization.

BLOCKCHAIN-ENFORCED LICENSING AND TOKENIZATION MODEL

I. Tokenized Intellectual Property Rights

To facilitate the **market-driven monetization of this patent**, we propose:

- **Quantum Error Suppression Tokens (QEST):** Each licensee of the Derived Hamiltonian framework will be required to purchase QEST tokens, which will be recorded on a **permissioned blockchain ledger**.

- **Smart Contracts for Compliance:** Automated royalty enforcement via Ethereum or similar smart contract platforms will ensure accurate and efficient royalty payments.

- **Real-Time Tracking of Deployments:** Firms implementing inverse topological decoding within quantum computing infrastructure will be monitored via hash-matching of proprietary algorithmic deployments.

II. Market-Based Royalty Adjustments

Instead of imposing a fixed licensing cost, **royalty payments will be dynamically adjusted based on market factors**, including:

- **Quantum Hardware Scalability**: Fees scale non-linearly based on the number of qubits in a commercialized system.

- **Deployment Volume**: Higher-tier commercial firms implementing inverse topological decoding will face **progressive royalty structures**.

- **Performance Metrics**: Systems achieving lower error rates using the patented method may be entitled to **royalty reductions** under incentivization programs.

DETAILED DESCRIPTION OF THE INVENTION

I. Theoretical Foundation and Empirical Validation

Inverse topological decoding is a **highly theoretical** framework that requires empirical validation through experimental quantum computing implementations. The core concept involves:

1. **Predefined Fault-Tolerant Code Spaces**: The Derived Hamiltonian is designed to evolve the quantum system into a pre-selected, error-free final state.
2. **Continuous Quantum Error Suppression**: Unlike standard QEC, errors are proactively mitigated rather than corrected post hoc.
3. **Cross-Platform Applicability**: This methodology is agnostic to specific qubit hardware, making it compatible with:
    - Superconducting qubits (flux-based qubit control)
    - Majorana-based topological qubits (braiding protocols)
    - Spin-qubit architectures (engineered Hamiltonian constraints)

CLAIMS

1. **Claim 1**: A method for inverse topological decoding in a quantum system, comprising:
    (a) Defining a final error-resilient quantum code space;
    (b) Constructing a Derived Hamiltonian that penalizes deviations from said code space;
    (c) Evolving quantum states such that typical noise processes naturally decay into the logical subspace.
2. **Claim 2**: A licensing schema utilizing **blockchain smart contracts** to regulate access to the inverse topological decoding methodology, wherein market-based royalties are dynamically adjusted.
3. **Claim 3**: A quantum computing deployment tracking system utilizing a **permissioned blockchain** to monitor commercial usage of inverse topological decoding.
4. **Claim 4**: The method of Claim 1, wherein a quantum processor executing inverse topological decoding is required to participate in an automated **decentralized royalty distribution system**.
5. **Claim 5**: A method of integrating blockchain-mediated intellectual property enforcement for quantum computing algorithms, ensuring **secure and verifiable transactions** for patent licensing and compliance.

ABSTRACT

This patent describes a theoretical framework for **inverse topological decoding via Derived Hamiltonians**, an advanced quantum error correction strategy. Unlike traditional reactive quantum error correction methods, inverse topological decoding **proactively enforces** fault-tolerant evolution at the Hamiltonian level. This invention further integrates a **blockchain-based royalty enforcement system**, ensuring transparent and scalable commercialization through tokenized licensing mechanisms. While highly theoretical, this innovation necessitates empirical validation across multiple quantum hardware platforms.

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SEAL

Under the seal of the United States Patent and Trademark Office, this specification is submitted for examination and issuance of letters patent.