QuantE: A Physics Inspired Energy Framework for Financial Market Dynamics

This paper presents **QuantE**, a physics inspired quantitative framework designed to model financial market behavior using classical energy laws. Instead of relying on lagging indicators or pattern recognition, QuantE treats price movement as a manifestation of force, energy transfer, and stored potential. The core hypothesis is that market reactions at critical levels are governed by the balance between **Live Energy** (kinetic) and **Rest Energy** (potential).

1. Motivation and Problem Statement

Traditional technical analysis focuses on price patterns, indicators, or statistical signals, often reacting after the move has occurred. However, markets are driven by participation, effort, and resistance. QuantE proposes that price behaves similarly to a physical system, where energy accumulates, transfers, and dissipates. Understanding these energy flows enables earlier and more reliable interpretation of breakouts, rejections, and fakeouts.

2. Scientific Mapping: Physics to Markets

In classical mechanics, kinetic energy represents motion, while potential energy represents stored force. QuantE maps these concepts directly to financial data. Volume is treated as mass, price change per unit time as velocity, and Supertrend boundaries as force transition edges.

Physics → Market Mapping:
Mass (m) → Volume (V)
Velocity (v) → $\Delta P / \Delta t$
Kinetic Energy → Live Energy
Potential Energy → Rest Energy

3. Live Energy (Kinetic Energy Model)

Live Energy measures the instantaneous force applied by the market during a single candle. It captures how aggressively price is moving relative to time and participation. Because it is derived from kinetic energy, Live Energy is always non negative and direction agnostic.

Live Energy Formula:
$LE = \frac{1}{2} \cdot V \cdot (\Delta P / \Delta t)^2$

Where ΔP is the absolute price change between open and close, Δt is the candle duration in minutes (e.g., 1440 for daily candles), and V is traded volume. The resulting value is expressed in abstract energy units, enabling comparison across candles and ranges.

4. Range Energy and Market Compression

When multiple candles occur within a confined price range, energy accumulates without immediate resolution. This compression phase stores force within the market structure. Quant E defines Range Energy as the sum of Live Energy values across the compression window.

Range Energy Formula:
$\text{Range Energy} = \Sigma\, LE$

5. Rest Energy (Potential Energy at Supertrend Breaks)

Rest Energy represents the potential energy stored at a Supertrend breakpoint. It is created when accumulated compression energy is not fully released during a breakout. These zones behave as market memory and can influence future price reactions.

Rest Energy Calculation:
Method 1: $RE = \Sigma LE$ (Compression Zone)
Method 2: $RE =$ Compression Energy $-$ Breakout Energy

Rest Energy may be positive, zero, or negative. Positive values indicate valid memory zones. Negative values imply full absorption, where the breakout force exceeded stored energy, leaving no reactive potential.

6. Energy Interaction and Reaction Logic

Market behavior at prior energy zones is determined by the interaction between current Live Energy and stored Rest Energy. This comparison forms the core decision engine of QuantE.

Reaction Rules:
Live Energy $>$ Rest Energy $\rightarrow$ Breakout continuation
Live Energy $<$ Rest Energy $\rightarrow$ Rejection or bounce
Live Energy $\approx$ Rest Energy $\rightarrow$ Fakeout or high volatility reaction

7. Memory Engine and Market Structure

QuantE stores only highquality Rest Energy zones as part of a memory engine. These zones represent unresolved force and act as probabilistic reaction points when revisited. The memory decays when energy is absorbed or decisively broken.

8. Conclusion

QuantE reframes financial markets as energy systems governed by physical principles rather than patterns or indicators. By quantifying both active and stored forces, the model offers a deterministic foundation for understanding market reactions. This framework establishes a base for future extensions, including adaptive thresholds, algorithmic execution, and empirical validation.

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