

# Electron under B\_U

## Projection Readout, Boundary Admissibility, and the Disqualification of Classical Trajectory

### B\_U 体系下的电子：投影读出、边界准入与经典轨迹失格

Formal bilingual note / 正式双语稿

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#### 第一页裁决 / First-Page Verdict

对象：本文处理的对象，是电子在 B\_U 体系下的层级归类。电子在投影层中持续波动、可被测量、可被谱结构索引、可被相干操作写入因果链；经典连续轨迹只是一种旧接口读出，不拥有定义电子客观性的最终资格。

Object. This note classifies the electron under the B\_U framework. The electron continues as a wave-like projection-stratum readout, can be measured, can be indexed by spectral structure, and can be written into a causal chain by coherence. Classical continuous trajectory is an inherited interface-readout; it does not possess final authority to define the electron's objectivity.

主命题：电子不是由连续轨迹定义的实体点，而是单一宇宙边界一致性下可被投影、相干、测量、索引与结算的微观读出单元。

Main claim. The electron is not an entity-point defined by continuous trajectory. It is a microscopic readout-unit that gains projection, coherence, measurement, indexing, and settlement under single-universe boundary consistency.

重要性：该裁决切开三个混写：电子与经典轨迹的混写，微观发生与宏观净贡献的混写，能级尺度与物理刷新率的混写。读者由此可以同时保留量子波动的持续性、测量读出的现实性、微观净贡献清零的清账纪律，以及宏观保留链的准入条件。

Importance. This judgment cuts three conflations: electron with classical trajectory, microscopic occurrence with macroscopic net contribution, and energy scale with physical refresh rate. It thereby preserves sustained quantum fluctuation, the reality of measurement readout, the clearing discipline of microscopic net-cancellation, and the admission condition of macroscopic retention.

本文完成的裁决：波动持续，轨迹失格；电子成立，经典路径退位；微观发生保留，微观净债清零；246 GeV 属于当前投影层的高成功可读出能级，可作为分辨率刷新窗口的结构类比； $10^{19}$  GeV 属于更高本体能级的远边界标记。

Verdict delivered. Fluctuation continues; trajectory is disqualified. The electron stands; the classical path withdraws. Microscopic occurrence remains; microscopic net debt is cleared. 246 GeV belongs to the current projection stratum as a high-success readable energy level and may serve as a structural analogy for a resolution-refresh window;  $10^{19}$  GeV marks a far boundary of a higher ontic energy scale.

#### 一、层级入口：电子的对象不再由轨迹先行 / I. Layered Entry: The Electron Is Not Trajectory-First

电子在投影层中以波动、耦合、谱结构、相互作用与测量事件持续显影。该显影具有现实工作区意义，因为实验、计算、建模与工程接口都在投影层完成。电子的可读出性成立；经典连续轨迹的解释主权失格。

The electron continues to appear in the projection stratum through fluctuation, coupling, spectral structure, interaction, and measurement events. This appearance has real-working-zone significance because experiment, computation, modeling, and engineering interfaces operate in the projection stratum. The electron's readability stands; the interpretive sovereignty of classical continuous trajectory is disqualified.

传统直觉把对象性压到路径占有：某物在哪里、如何走、沿哪条连续轨迹移动。量子跃迁让这种直觉在电子层级失去主权。无经典轨迹显示的是旧路径接口失效，电子的存在资格则转入边界准入、状态读出、谱读出与测量相干。

Inherited intuition compresses objecthood into path-occupation: where something is, how it moves, and through which continuous trajectory it travels. Quantum transition removes that sovereignty at the electron stratum. Lack of classical trajectory marks failure of the old path-interface; the electron's standing moves to boundary admissibility, state readout, spectral readout, and measurement coherence.

归类裁决：电子属于投影层稳定微观读出项；连续轨迹属于经典接口的可视化模型；宏观保留资格属于结算层裁决。

Classification judgment. The electron belongs to stable microscopic readout in the projection stratum; continuous trajectory belongs to a visualization model of the classical interface; macroscopic retention standing belongs to settlement-layer adjudication.

## 二、电子的 B\_U 正定义 / II. Positive Definition of the Electron under B\_U

定义：电子是单一宇宙边界一致性下，在投影层中以电荷、质量、自旋、耦合、谱结构与测量相干方式取得可读出、可索引、可结算资格的微观对象化读出项。

Definition. The electron is a microscopic objectified readout that gains readability, indexability, and settleability in the projection stratum through charge, mass, spin, coupling, spectral structure, and measurement coherence under single-universe boundary consistency.

机制：电子不依赖经典连续轨迹取得客观性。它通过边界一致性下的可重复测量、谱稳定性、相互作用可审计性、因果链写入与单值结算取得客观性。其微观快变贡献在宏观账本中不取得自动保留资格；相关净贡献经由投影清零、快慢正交与残差分层被清账，宏观保留链在清账之后启动。

Mechanism. The electron does not receive objectivity from classical continuous trajectory. It receives objectivity through repeatable measurement, spectral stability, auditable interaction, causal-chain inscription, and single-valued settlement under boundary consistency. Its fast microscopic contribution does not automatically gain retention standing in the macroscopic ledger; the related net contribution is cleared through projection cancellation, fast-slow orthogonality, and residual stratification, and the macroscopic retained chain begins after that clearing.

裁决：电子的客观性由可结算结构定义。轨迹可作为低分辨率图像、计算辅助与经典接口近似继续使用；它不再承担电子存在的根定义。

Judgment. The electron's objectivity is defined by settleable structure. Trajectory may continue as a low-resolution image, a computational aid, and a classical-interface approximation; it no longer carries the root-definition of electron existence.

## 三、两处越界的切除 / III. Two Overreaches Cut Away

1. 电子轨迹被清零 -> 微观净贡献被清零。被清零的对象，是微观快变扰动对宏观反馈账本的非零净贡献。电子作为可测微观读出项、态演化接口、相互作用节点与测量事件仍然成立。

1. Electron trajectory is zeroed -> microscopic net contribution is zeroed. The item being zeroed is the nonzero net contribution of fast microscopic disturbance to the macroscopic feedback ledger. The electron still stands as a measurable microscopic readout, state-evolution interface, interaction node, and measurement event.

2. 原地消失、凭空出现 -> 连续轨迹模型失格。量子跃迁显示经典连续路径接口在该分辨率窗口内失去解释主权。电子并未进入空无；连续路径读出被状态读出、谱读出与相干结算替代。

2. Vanishing and reappearing from nowhere -> disqualification of the continuous-trajectory model. Quantum transition shows that the classical continuous-path interface loses interpretive sovereignty within that resolution window. The electron does not enter nothingness; continuous-path readout is replaced by state readout, spectral readout, and coherence settlement.

## 四、最小形式链 / IV. Minimal Formal Chains

第一条链给出电子读出的边界准入顺序。电子读出先受 B\_U 与 B\_0 约束，再经 Pi\_B0 进入投影读出，经测量相干写入因果链，支付信息更新成本，并在单值结算面取得结果。

The first chain gives the order of boundary admission for electron readout. Electron readout is first governed by B\_U and B\_0, then enters projection readout through Pi\_B0, is written into a causal chain by measurement coherence, pays information-update cost, and obtains result on the single-valued settlement surface.

```
B_U => B_0 => Pi_{B_0} => electron readout
electron readout => measurement coherence => Delta I > 0 => R_single
```

第二条链给出微观净贡献清账。微观可接受场空间分解为慢变残差子空间与零均值快变子空间；快变项的平均为零，快慢正交使协方差消失，微观反馈平均严格归零。

The second chain gives the clearing of microscopic net contribution. The admissible microscopic field space decomposes into a slow residual subspace and a zero-mean fast subspace; the fast term has zero mean, fast-slow orthogonality cancels covariance, and the microscopic feedback average vanishes exactly.

```
H_micro = H_slow ⊕ H_fast^0
h = P_micro[-grad S_x(t)] ∈ H_fast^0
⟨h⟩_micro = 0
H_slow ⊥ H_fast^0
⟨delta_feedback⟩_micro = 0
```

最终收口链：电子事件交付局部发生；测量相干将其写入因果链；单值结算交付现实读出；微观快变净贡献不自动进入宏观保留链。

Final closure chain: the electron event delivers local occurrence; measurement coherence writes it into a causal chain; single settlement delivers reality-readout; the fast microscopic net contribution does not automatically enter the macroscopic retained chain.

```
electron event => local occurrence => coherence when measured
coherence => single settlement => no automatic macroscopic net retention
```

## 五、波动持续与轨迹失格 / V. Sustained Fluctuation and Trajectory Disqualification

电子在投影层的波动可以持续。失格的是经典连续轨迹作为现实 standing 的资格。轨迹失格，是微观快变净贡献在宏观账本中被清零后的表面现象与可读特征。

The electron's fluctuation can continue in the projection stratum. What is disqualified is the standing of classical continuous trajectory as reality-standing. Trajectory disqualification is the surface appearance and readable feature of fast microscopic net contribution being zeroed in the macroscopic ledger.

电子没有被取消。电子作为投影层微观读出项持续成立，能够交付波动、耦合、谱结构、相互作用与测量事件。经典轨迹主权被取消，因为连续路径不能再作为电子存在的定义方式。

The electron is not cancelled. It stands continuously as a microscopic readout in the projection stratum and delivers fluctuation, coupling, spectral structure, interaction, and measurement events. The sovereignty of classical trajectory is cancelled because continuous path can no longer define electron existence.

清零对象是微观净贡献。微观快变项可以发生，但其非零净贡献不进入宏观保留链。无连续轨迹是微观净贡献清零在现象侧的表现。

The zeroed item is microscopic net contribution. Fast microscopic terms may occur, but their nonzero net contribution does not enter the macroscopic retained chain. Lack of continuous trajectory is the phenomenological display of microscopic net-cancellation.

硬句：波动持续，轨迹失格；电子成立，经典路径退位；微观发生保留，微观净债清零。

Hard line: fluctuation continues, trajectory is disqualified; the electron stands, the classical path withdraws; microscopic occurrence remains, microscopic net debt is cleared.

## 六、分辨率刷新窗口：246 GeV 与 $10^{19}$ GeV / VI. Resolution-Refresh Window: 246 GeV and $10^{19}$ GeV

GeV 是能级尺度。本文使用“分辨率刷新窗口”作为结构类比，用于解释当前投影层为何可读出、有间隙、可持续波动，并保留谱结构。该类比不定义物理时间频率，不描述单位时间内的采样次数。

GeV is an energy scale. This note uses “resolution-refresh window” as a structural analogy to explain why the current projection stratum is readable, gap-bearing, capable of sustained fluctuation, and able to preserve spectral structure. The analogy does not define physical time-frequency and does not describe samples per unit time.

246 GeV 是当前投影层中的高成功可读出能级。为帮助理解，可将其结构性类比为在一个较低分辨率的刷新窗口：它允许稳定读出、持续波动、可测量结构与谱显影。

246 GeV is a high-success readable energy level in the current projection stratum. As an aid to understanding, it may be structurally compared to a lower-resolution refresh window: it allows stable readout, sustained fluctuation, measurable structure, and spectral display.

$10^{19}$  GeV 属于更高本体能级的远边界标记。它标记更深分辨率闭合的远端位置，不是当前现实工作区已经占有的对象区，也不是通常意义上的刷新率。

$10^{19}$  GeV belongs to a far boundary marker of a higher ontic energy scale. It marks the remote position of deeper resolution-closure; it is not an object-zone already occupied by the present working regime and is not a refresh rate in the ordinary sense.

较低分辨率刷新窗口会生成可读出片段，而不会填满本体级连续细节。由此，投影层读出会保留间隙，经典连续轨迹失去 standing。这里的间隙不是空无，而是当前分辨率读出尚未抵达更高本体级刷新阈值的结构差。

A lower-resolution refresh window produces readable segments without filling ontic-level continuous detail. Projection-stratum readout therefore remains gap-bearing, and classical continuous trajectory loses standing. The gap is not emptiness; it is the structural difference between current resolution-readout and the far refresh threshold of a higher ontic scale.

边界句：GeV 锁定能级；“刷新”只作分辨率读出类比。能级是物理量，刷新是解释桥。

Boundary line. GeV locks energy scale; “refresh” serves only as a resolution-readout analogy. Energy scale is the physical quantity; refresh is the explanatory bridge.

## 七、错误链与正向链 / VII. Error Chain and Positive Chain

错误链从经典路径接口越界开始。连续轨迹被误写为电子客观性的定义；无轨迹被误读为对象消失；微观快变项被误升为宏观净贡献；246 GeV 被误升为本体级完成态；“刷新率”被误读为物理时间频率。

The error chain begins when the classical path-interface overreaches. Continuous trajectory is written as the definition of electron objectivity; lack of trajectory is misread as object disappearance; fast microscopic terms are elevated into macroscopic net contribution; 246 GeV is elevated into ontic-level completion; “refresh rate” is misread as physical time-frequency.

```
classical path overreach => trajectory as objectivity
no trajectory => false disappearance
fast microscopic terms => false macroscopic net contribution
246 GeV => false ontic completion
refresh analogy => false physical frequency
```

正向链从边界准入开始。B\_U 固定单一边界；Pi\_B0 执行投影读出；电子作为微观读出项成立；测量相干写入因果链；微观净贡献经投影清零清账；宏观保留链只接收已清账、已索引、已结算的读出。

The positive chain begins from boundary admissibility. B\_U fixes the single boundary; Pi\_B0 performs projection readout; the electron stands as microscopic readout; measurement coherence writes it into a causal chain; microscopic net contribution is cleared by projection cancellation; the macroscopic retained chain receives only cleared, indexed, and settled readout.

```
B_U => B_0 => Pi_{B_0} => electron readout
electron readout => coherence => causal chain => Delta I => R_single
microscopic net contribution => projection cancellation => cleared background
cleared background => macro-retention eligibility
```

## 八、必要条件与充分条件 / VIII. Necessary and Sufficient Conditions

电子作为 B\_U 下的投影层微观读出项，至少需要五项必要条件：边界一致性、谱稳定性、测量可相干性、索引可持续性、结算可落账性。缺少任一项，电子读出会滑回旧接口的想象对象或不可结算残差。

The electron as a microscopic projection-stratum readout under B\_U requires at least five necessary conditions: boundary consistency, spectral stability, measurement coherence, persistence of indexability, and settlement capability. If any condition fails, electron readout slides back into an imagined object of the old interface or an unsettled residual.

1. 边界一致性：电子读出必须相对于 B\_0 保持可接受接口。

1. Boundary consistency: electron readout must retain an admissible interface relative to B\_0.

2. 谱稳定性：电荷、质量、自旋、耦合与谱结构必须在分辨率推进中可继承。

2. Spectral stability: charge, mass, spin, coupling, and spectral structure must be inheritable across resolution advancement.

3. 测量可相干性：电子事件必须能够通过相干操作写入因果链。

3. Measurement coherence: electron events must be writable into a causal chain through coherence operations.

4. 索引可持续性：电子相关量、关系与操作规则必须可重复指认。

4. Persistence of indexability: electron-related quantities, relations, and operational rules must be repeatably indexable.

5. 结算可落账性：电子读出必须能够进入可审计、可复现、可校核的单值结算。

5. Settlement capability: electron readout must enter auditable, reproducible, checkable, single-valued settlement.

充分判定：若电子读出同时满足边界一致性、谱稳定性、测量相干、索引持续、单值结算，并且其快变微观净贡献不自动进入宏观保留链，则可充分归类为 B\_U 下的投影层稳定微观读出项。

Sufficiency judgment. If electron readout jointly satisfies boundary consistency, spectral stability, measurement coherence, persistent indexing, and single settlement, while its fast microscopic net contribution does not automatically enter the macroscopic retained chain, it may be sufficiently classified as a stable microscopic readout in the projection stratum under B\_U.

## 九、最终归类裁决 / IX. Final Classification Judgment

电子在 B\_U 体系下取得新的清晰位置。它不是经典路径占有物，而是投影层中可被边界准入、测量相干、谱结构与结算链读出的微观对象化读出项。

The electron receives a clarified position under B\_U. It is not a classical path-occupying item. It is a microscopic objectified readout in the projection stratum, readable through boundary admissibility, measurement coherence, spectral structure, and settlement chain.

电子在投影层的波动可以持续；被取消的是经典连续轨迹作为现实 standing 的资格。轨迹失格，是微观快变净贡献无法进入宏观保留链之后，在现象侧呈现出的表面特征。

The electron's fluctuation can continue in the projection stratum; what is withdrawn is the standing of classical continuous trajectory as reality-standing. Trajectory disqualification is the surface feature displayed after fast microscopic net contribution fails to enter the macroscopic retained chain.

246 GeV 属于当前投影层的高成功可读出能级； $10^{19}$  GeV 属于更高本体能级的远边界标记。二者之间的差距说明当前读出可以高度稳定地工作，同时整体纵深仍极大。

246 GeV belongs to the current projection stratum as a high-success readable energy level;  $10^{19}$  GeV belongs to a far boundary marker of a higher ontic energy scale. The gap between them shows that current readout can operate with high stability while the remaining depth is still immense.

## 文尾锤击 / Final Hammer

主裁决句：电子的客观性不由轨迹占有给出，而由边界一致性下的可结算读出给出。

Main judgment: the electron's objectivity is not given by trajectory-occupation; it is given by settleable readout under boundary consistency.

定位句：电子属于投影层稳定微观读出项，经典轨迹属于旧接口表象，宏观保留资格属于结算层裁决。

Positioning line: the electron belongs to stable microscopic readout in the projection stratum; classical trajectory belongs to an old-interface appearance; macroscopic retention standing belongs to settlement-layer judgment.

推进句：波动持续，轨迹失格；电子成立，经典路径退位；微观发生保留，微观净债清零。

Advancement line: fluctuation continues, trajectory is disqualified; the electron stands, the classical path withdraws; microscopic occurrence remains, microscopic net debt is cleared.

错误链切除句：无轨迹不交付对象消失，246 GeV 不交付本体完成，刷新类比不交付物理频率定义。

Error-chain cut: lack of trajectory does not deliver object disappearance, 246 GeV does not deliver ontic completion, and the refresh analogy does not deliver a physical frequency definition.

归档句：电子文件归入“投影读出 - 边界准入 - 测量相干 - 微观净贡献清零 - 宏观保留链准入”这一物理层接口。

Archive line: this electron note is filed under the physical-layer interface of projection readout, boundary admissibility, measurement coherence, microscopic net-cancellation, and macroscopic-retention eligibility.

最终封口句：电子交付微观发生；投影清零清除快变净债；测量相干写入因果链；单值结算交付现实读出。

Final closure: the electron delivers microscopic occurrence; projection cancellation clears fast net debt; measurement coherence writes the causal chain; single settlement delivers reality-readout.

## 附录：B\_U 文件索引（1-34） / Appendix: B\_U File Index (1-34)

1. Single-Universe Boundary Axiomatics / 单一宇宙边界公理学. DOI: 10.5281/zenodo.19508651
2. Dynamic Completeness and Boundary Fixation / 动态完备性与边界固定. DOI: 10.5281/zenodo.19509867
3. Boundary Drift and Ontological Fragmentation / 边界漂移与本体论碎裂. DOI: 10.5281/zenodo.19511402
4. Global Physical Admissibility under Single-Universe Boundary Consistency / 单一宇宙边界一致性下的全局物理资格. DOI: 10.5281/zenodo.19513566
5. Mathematical Alignment under Dynamic Boundary Fixation / 动态边界固定下的数学对齐. DOI: 10.5281/zenodo.19522421
6. Boundary Matching and Feedback Dynamics under Dynamic Completeness / 动态完备性下的边界匹配与反馈动力学. DOI: 10.5281/zenodo.19522847
7. Low-Entropy Drive and Minimal-Action Differential under Dynamic Boundary Fixation / 动态边界固定下的低熵驱动与最小作用差分. DOI: 10.5281/zenodo.19533337
8. Information Update Cost under Dynamic Boundary Fixation / 动态边界固定下的信息更新成本. DOI: 10.5281/zenodo.19533654
9. Functional-Integral Information Update Cost under Dynamic Boundary Fixation / 动态边界固定下的信息更新成本的泛函积分形式. DOI: 10.5281/zenodo.19548086
10. Experimental Morphisms under Boundary Consistency / 边界一致性下的实验态射. DOI: 10.5281/zenodo.19534090
11. B\_U and the Elimination of Pseudo-Problems in Physics / B\_U 与物理学中伪问题的消除（入口版）. DOI: 10.5281/zenodo.19536499
12. B\_U and the Elimination of Pseudo-Problems in Physics (Complete Edition) / B\_U 与物理学中伪问题的消除（完整版）. DOI: 10.5281/zenodo.19537358
13. Measurement as Coherence under Single-Universe Boundary Consistency / 单一宇宙边界一致性下的测量即相干. DOI: 10.5281/zenodo.19549658
14. Dynamic Completeness and the One-Way Entropy Gradient / 动态完备性与单向熵梯度. DOI: 10.5281/zenodo.19552142
15. Conscious Standing under Single-Universe Boundary Consistency / 单一宇宙边界一致性下的意识 standing. DOI: 10.5281/zenodo.19563522
16. Falsifiability, Admissibility, and Standing under Single-Universe Boundary Consistency / 单一宇宙边界一致性下的可证伪性、可采纳性与 standing. DOI: 10.5281/zenodo.19555476
17. Self-Recognition and Indexability under Fixed Boundary Coherence / 固定边界相干下的自识别与可指认性. DOI: 10.5281/zenodo.19567038
18. Low-Entropy Ordered Consciousness in the Projection Stratum / 投影层中的低熵有序意识. DOI: 10.5281/zenodo.19567659
19. Quantum Gravity as Boundary Misreading under Single-Universe Consistency / 单一宇宙一致性下作为边界误读的量子引力. DOI: 10.5281/zenodo.19570573
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