

# Lecture 02 (a.k.a. Lecture 00): If Planck Prosecuted Cagliostro for Gacha Fraud

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Lecture 02 in Release, Lecture 00 in Timeline  
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## Act 1. The Prosecution Opens

**Scene:** The Alchemical Court of Arcadia. Lady Cagliostro stands accused of manipulating the probability mechanics of a gacha system to induce excessive downloadable content purchases. Max Planck<sup>1</sup> stands as the prosecutor; Werner Heisenberg<sup>2</sup> serves as defense counsel. Paul Dirac observes silently from the gallery.

Planck (Prosecutor):

You claimed that continuous purchases yield continuous rewards. Yet the actual rewards were quantized. This deception mirrors the downfall of classical blackbody radiation theory<sup>a</sup>!

<sup>a</sup>See Planck's resolution of the ultraviolet catastrophe via quantized energy emission [6].

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<sup>1</sup>See [10] for biographical background on Max Planck.

<sup>2</sup>See [11] for Heisenberg's contributions to quantum mechanics and uncertainty.

Cagliostro (Defendant):

Oh my Alchemy is about beauty and profit, isn't it? Isn't it only natural to show off the prettiest probabilities<sup>a</sup>?

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<sup>a</sup>See [8] for Cagliostro's flair for aesthetic and economic alchemy.

**Planck presents the disparity between classical expectations and quantum hypotheses:**

$$E_n = n\hbar\omega, \quad n \in \mathbb{N}^3$$

Planck:

Just as I abandoned the continuous model of blackbody radiation and introduced quantization<sup>a</sup>, your gacha system masquerades as continuous—yet it's fundamentally discrete!

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<sup>a</sup>The introduction of the energy quantum marked the birth of quantum theory [3, 7].

## Act 2. The Uncertainty of Gacha

Heisenberg (Defense Counsel):

Have you ever observed the probability of a gacha you did not roll?

Cagliostro:

Of course not! Only the beautiful pulls are worth looking at <sup>a</sup>

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<sup>a</sup>A tongue-in-cheek reflection of observer bias in gacha culture. See also [9].

**Heisenberg invokes the Uncertainty Principle—recontextualized for consumer systems:**

$$\Delta G \cdot \Delta P \geq \frac{\hbar}{2}^4$$

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<sup>3</sup>The quantization of energy levels was first introduced by Planck to explain blackbody radiation [6].

<sup>4</sup>Adapted metaphorically from Heisenberg's uncertainty principle, where  $\Delta x \cdot \Delta p \geq \hbar/2$

Here,  $\Delta G$  represents the uncertainty in gacha outcomes, and  $\Delta P$  the uncertainty in purchase intent.

Heisenberg:

To fix the sentence is to blur the crime. To confirm guilt is to render the sentence uncertain. The same is true in gacha: unobserved probabilities do not exist<sup>a</sup>.

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<sup>a</sup>Philosophically akin to the Copenhagen interpretation, which asserts that quantum properties have no definite value until measured [5].

### Act 3. Quantum of Purchase

Planck:

If purchases are continuous, shouldn't the outcomes be so as well? That was our naive belief about blackbody radiation too<sup>a</sup>.

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<sup>a</sup>In classical physics, blackbody emission was expected to be continuous across all frequencies—an expectation shattered by the ultraviolet catastrophe [6, 3].

Cagliostro:

But the world isn't that simple, darling ! Games deliver value in quantum packets: merch drops, character unlocks... **Even doujinshi are quantized goods, are they not?**<sup>a</sup>

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<sup>a</sup>This metaphor reflects the quantization of energy levels—discrete and indivisible—as first formalized by Planck [6].

**Planck mutters in an aside.**

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expresses the intrinsic limits of simultaneous measurement [4, 3].

Planck (aside):

Once again... it seems the quantum hypothesis explains reality better than I dared expect<sup>a</sup>.

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<sup>a</sup>Planck's reluctant acceptance of energy quantization marked a turning point in modern physics [7].

## Act 4. The Time-Reversed Trial

**Scene:** Just before the verdict, Dirac rises quietly from the gallery, his voice almost a whisper against the ticking of the courtroom clock.

Dirac (aside):

Time does not flow in one direction—like the wavefunction, it contains all paths<sup>a</sup>. If trials exist across the timeline, then remembering a past one means another has vanished. As though a hole has appeared in the Dirac sea<sup>b</sup>.

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<sup>a</sup>This reflects the time-symmetric interpretations of quantum theory and Feynman–Stueckelberg's treatment of antiparticles as particles moving backward in time [2, 1].

<sup>b</sup>Dirac's sea of negative-energy states proposed the existence of positrons as “holes” in a filled vacuum [2].

Dirac:

Unbought goods do not exist. But... when a hole forms, reality begins to leak<sup>a</sup>.

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<sup>a</sup>An allegorical nod to quantum field theory, where vacua are not empty, and absences are just as real as presences [12].

## Epilogue: Lecture 00

This trial shall be recorded as a prelude to the upcoming “Lecture 01,” marking the beginning of a quantum entanglement between payments, probabilities, and the flow of time.

**Final Scene:** As all characters exit, the in-game statistics screen displays:

$$\sum_{n=1}^{\infty} P_n = 1, \quad \text{where } P_n = 0 \text{ if not purchased.}^5$$

## References

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- [2] Paul Adrien Maurice Dirac. *The principles of quantum mechanics*. Number 27. Oxford university press, 1981.
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- [5] John von Neumann. Mathematical foundations of quantum mechanics. 1955.
- [6] Max Planck. On the law of distribution of energy in the normal spectrum. *Annalen der physik*, 4(553):1, 1901.
- [7] Jun John Sakurai and Jim Napolitano. *Modern quantum mechanics*. Cambridge University Press, 2020.
- [8] Wikipedia contributors. Cagliostro (granblue fantasy) — granblue fantasy wiki, 2024. Accessed: 2025-04-17.
- [9] Wikipedia contributors. Gacha game — wikipedia, the free encyclopedia, 2024. Accessed: 2025-04-17.
- [10] Wikipedia contributors. Max planck — wikipedia, the free encyclopedia, 2024. Accessed: 2025-04-17.

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<sup>5</sup>A meta-quantum analogy: all possible states exist, but unobserved (or unbought) states are effectively zeroed by decoherence [12].

- [11] Wikipedia contributors. Werner heisenberg — wikipedia, the free encyclopedia, 2024. Accessed: 2025-04-17.
- [12] Wojciech H Zurek. Decoherence and the transition from quantum to classical-revisited. *Los Alamos Science*, 27:86–109, 2002.