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Erratum

Erratum: The Scaling Entropy–Area Thermodynamics and the Emergence of Quantum Gravity

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1 Article Text

The author wishes to correct and clarify several points in the original publication titled "*The Scaling Entropy–Area Thermodynamics and the Emergence of Quantum Gravity*" [1]. These corrections address both typographical and algebraic issues that, while not altering the scientific conclusions of the article, improve mathematical rigor and formal consistency.

1.1 Correction to Section 3.2: Verbal form

- Original Text:

On page 26, section "Black Holes' Equilibrium Thermodynamics", just before equation (9):

"As hawking radiation saturate exactly the Bekenstein bound, we can isolate the time of evaporation as [2]"

- Correction:

"As hawking radiation saturates exactly the Bekenstein bound, we can isolate the time of evaporation as [2]"

1.2 Correction to Section 3.2, Equation (9): Dimensional Consistency

- Original Text:

On page 26, section "Black Holes' Equilibrium Thermodynamics", equation (9) incorrectly displays the factor c^2, which is dimensionally inconsistent.

- Correction:

The correct formulation should read c^4, in accordance with dimensional analysis and the cited reference [2]. This correction ensures that the units remain coherent.

$$t_{evap} = -\frac{64\pi^3 G^2 M^3}{\hbar c^4 ln(2)}$$

1.3 Correction to Section 3.2, Equations (11) and (12): Algebraic Sign and Simplification

- Original Text:

On page 27, section "Black Holes' Equilibrium Thermodynamics", equations (11) and (12) were presented with a sign inconsistency and without adequate intermediate steps:

"We inject the value of ($t = t_{evap}$) in equation (8), we obtain:

$$S = -k\frac{\kappa MA}{\hbar c}$$

This yields the final form for entropy in terms of surface gravity κ and black hole properties:

$$S = -\kappa MA$$

in natural units where ($\hbar$ = c = k = 1)."

- Correction:

The corrected derivation reads as follows:

"We inject the value of ($t = t_{evap}$) in equation (8), we obtain:

$$S = -\frac{k\kappa ln(2)}{4\pi^2 c} \cdot \left(-\frac{4\pi^2 MA}{\hbar ln(2)}\right)$$

Simplify:
· ln(2) cancels.
· $4\pi^2$ cancels.
· The minus signs cancel.

$$S = k\frac{\kappa MA}{\hbar c}$$

$$S = \kappa MA$$

in natural units where ($\hbar$ = c = k = 1)."

1.4 Correction to Section 4.3: Missing Symbol in Text

- Original Text:

On page 29, end of section "Gravitational Fine-Grained Entropy", the sentence beginning "Here, quantifies..." is missing a symbol.

- Correction:

The corrected sentence should read: "Here, κ quantifies"

The typographical corrections, the algebraic corrections of equations and the added explicit simplifications do not impact on the scientific conclusions or theoretical interpretations presented in the original article. The original scientific arguments and implications remain fully valid, as the original published text did not explicitly rely upon the errors in its analysis or conclusions.

These corrections do not affect the core scientific claims or theoretical conclusions of the article. Instead, they improve mathematical transparency and strengthen the logical consistency of the Scaling Entropy–Area Thermodynamics (SEAT) framework.

The author expresses gratitude to the editorial board of IPI Letters for their continued commitment to scientific integrity.

References

[1] Denis, O. (2024). The Scaling Entropy-Area Thermodynamics and the Emergence of Quantum Gravity. IPI Letters, 2(3), 23–34. https://doi.org/10.59973/ipil.126{}

[2] Denis, O. (2023). The entropy of the entangled Hawking radiation. IPI Letters, 1, 1–17. https://doi.org/10.59973/ipil.9