Experimental Validation of the Atomic Statistical Hypothesis: Resolving Quantization Through Continuous Waves

David Barbeau* Wolfgang Sturm†

July 2025

Abstract

The Atomic Statistical Hypothesis (ASH) addresses an overlooked flaw in quantum mechanics: the assumption of discrete quanta as fundamental. Instead, ASH posits that quantization emerges statistically from interactions between continuous electromagnetic waves and matter. This paper leverages Wolfgang Sturm's experimental work to provide empirical support for ASH, demonstrating that classical continuous fields can replicate quantum phenomena, including interference energy deficits, classical entanglement, and Bell inequality violations. These findings, drawn from precise experimental setups, confirm ASH's premise of continuity and locality, offering a parsimonious alternative to discrete quantum models.

1 Introduction

Quantum mechanics assumes discrete quanta to explain phenomena like the photoelectric effect and entanglement, yet struggles with paradoxes such as wave-particle duality and non-locality. The Atomic Statistical Hypothesis (ASH) proposes that these effects arise from statistical interactions of continuous waves with material thresholds, addressing an overlooked reliance on discreteness [Barbeau, 2025]. Experimental work by Wolfgang Sturm, using interferometers, double slits, capacitors, and simulations, provides compelling evidence that continuous fields suffice to mimic quantum behaviors [Sturm, 2021a, 2023b,a, 2022, 2021b]. This paper synthesizes these results to validate ASH.

2 Atomic Statistical Hypothesis (ASH): Theoretical Framework

ASH models light as a continuous wave, described by the electric field $E(t) = E_0 \cos(2\pi\nu t)$, with flux proportional to $E_0^2\nu$. Absorption occurs when the integrated field over a cycle exceeds a material-specific work function, $\int E\,dt \geq \phi$, ejecting an electron with kinetic energy $K = h_{\text{eff}}\nu - \phi$, where residual energy dissipates as heat or infrared emission ($h\nu' < h\nu$). The effective Planck constant, h_{eff}, is a statistical average, $\langle h \rangle = \int P(\phi)h(\phi)\,d\phi$, determined by the material's threshold distribution $P(\phi)$. Photoelectric current scales as $I \propto (\nu - \nu_0)$ times intensity above the threshold frequency ν_0. Entanglement correlations result from local sampling of pre-set wave phases or polarizations, eliminating the need for non-local mechanisms.

3 Experimental Validation from Sturm's Work

Sturm's experiments, conducted with accessible yet precise setups, demonstrate that continuous wave models account for quantum-like phenomena, supporting ASH's framework. Each subsec-

*Independent Researcher, david@bigbadaboom.ca, @stoic_david on X, David Barbeau on ai.viXra
†Independent Researcher, Wolfgang Sturm on viXra

tion below ties specific findings to ASH's predictions, with citations to Sturm's viXra papers and their respective weblinks.

3.1 Hidden Energy in Destructive Interference

Sturm's work on destructive interference reveals that energy is conserved but becomes unmeasurable in certain configurations, challenging discrete photon models [Sturm, 2021a].

- **Setup and Measurements**: A Jamin interferometer splits a laser beam, with one mirror adjusted via micrometer for interference. Constant laser power yields 500 μA in constructive interference, dropping to 420 μA in destructive interference. A double-slit experiment shows single-slit currents of 9 μA and 8 μA (sum 17 μA), but only 13 μA when both slits are open, indicating a 4 μA deficit. - **Simulation**: A 75 MHz signal through transmission lines with a 180° phase shift produces zero visible power, $P_{\text{visible}} = (U_a + U_b)^2/(2Z_0) = 0$, while total beam power, $P_{\text{beam}} = (U_a^2/Z_0) + (U_b^2/Z_0)$, equals the laser input. - **Implications for ASH**: The "hidden" energy in invisible superpositions supports ASH's continuous wave model, where detection thresholds create apparent quantization without energy loss.

See: `https://vixra.org/abs/2109.0196` [Sturm, 2021a].

3.2 Classical Fields Mimicking Quantum Entanglement

Sturm demonstrates that classical electric fields can replicate entanglement and Bell inequality violations, aligning with ASH's local phase sampling [Sturm, 2023b].

- **Setup and Measurements**: Capacitors (1 nF, 10 nF) charged in parallel yield equal voltages ($U_1 = U_2$). Post-disconnection, series measurements show $U_1 + U_2 = 2U_1$ or $U_1 - U_2 = 0$ V. A "spooky action" setup with alternating voltages on copper bars produces color states (red/green/dark/yellow superpositions). Phase shifters, analogous to polarizers, and a 4-quadrant multiplier yield expectation values $E(\alpha, \beta) \approx 0.7, 0.7, -0.7, 0.7$, with CHSH parameter $S = 2.91$ (exceeding the classical limit of 2). - **Equations**: Capacitance relation $C = Q/U$; CHSH parameter $S = E(\alpha, \beta) - E(\alpha, \beta') + E(\alpha', \beta) + E(\alpha', \beta')$. - **Implications for ASH**: Classical fields produce quantum-like correlations via local mechanisms, supporting ASH's rejection of non-locality.

See: `https://vixra.org/abs/2302.0109` [Sturm, 2023b].

3.3 Bell/CHSH Inequality Violations with Classical Simulations

Sturm's simulations further test Bell/CHSH inequalities using classical and quantum-like data [Sturm, 2023a].

- **Setup and Measurements**: An electronic simulation converts angular differences to voltages, with classical data yielding $S < 2$ and quantum-like nonlinear responses producing $S > 2$ (e.g., $S = 2.8$ in simulation). - **Implications for ASH**: Continuous field models replicate quantum violations, reinforcing ASH's statistical emergence of correlations.

See: `https://vixra.org/abs/2310.0055` [Sturm, 2023a].

3.4 Seven Theses on Photon Behavior

Sturm's theses, derived from interference experiments, propose continuous wave properties for photons [Sturm, 2022].

- **Key Claims**: Photons exhibit measurable mass, mutual interactions, and perfect destructive interference; hidden energy persists in superpositions. - **Supporting Experiments**: Interference setups with mirrors and lasers confirm continuous wave behaviors. - **Implications for ASH**: These theses align with ASH's continuous wave framework, challenging discrete photon models.

See: `https://vixra.org/abs/2202.0119` [Sturm, 2022].

3.5 Hidden Energy Transfer

Sturm explores invisible energy transmission using coils [Sturm, 2021b].

- **Setup and Measurements**: Transmitting coils in phase opposition produce no voltage at destructive interference. A receiver with a parametric oscillator extracts energy, revealing a difference signal at 5 mm separation. - **Implications for ASH**: Hidden energy can be transmitted and extracted, supporting continuous wave interactions over discrete quanta.

See: `https://vixra.org/abs/2111.0104` [Sturm, 2021b].

4 Discussion

Sturm's experiments collectively address the overlooked assumption of discreteness in quantum mechanics, demonstrating that continuous waves can account for interference, entanglement, and Bell violations. These findings validate ASH's premise that quantization is a statistical artifact of material interactions, with h_{eff} emerging from threshold distributions. Future experiments could test h_{eff} variations across materials (e.g., cesium vs. sodium) via precise photoelectric yield measurements, further solidifying ASH's predictions.

5 Conclusion

ASH, supported by Sturm's empirical evidence, offers a continuous, local alternative to quantum mechanics' discrete framework. By addressing the overlooked problem of assumed quantization, these experiments pave the way for a simpler, paradox-free understanding of quantum phenomena.

References

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