

The Pyrrhonist's Vacuum: Isostheneia in the Search for a Substrate for Einsteinian Relativity

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1. Introduction

Professional physics has entered a “Scholastic” phase, in which the constancy of Special Relativity Theory (SRT) is treated as a dogmatic, fixed surface structure beneath which various incompatible “fundamental” ontologies are hypothesized. By surveying the mutually exclusive claims of Jacobson, Volovik, Wen, and ’t Hooft, we

argue in this essay that the current state of scientific theory represents a perfect *isostheneia* (equipollence). Following the Pyrrhonian method of Sextus Empiricus (Sextus Empiricus, 1996), we find that the only intellectually honest move is the suspension of judgment (*epoché*), treating these models not as literal descriptions of a “qubit-net” or “superfluid” world, but as mere appearances.

2. The Trope of Diaphonia (Disagreement)

The professionalization of physics has produced a peculiar “Tower of Babel” effect. While every major theorist agrees on the “measurables” or phenomena—as per the empirical success of Einstein’s Lorentz invariance—there is a profound *diaphonia* regarding the underlying “beables” or reality (Bell, 1987).

For Grigori Volovik, the vacuum is a physical liquid, specifically a Helium-3 superfluid where gravity is merely a low-energy collective excitation (Volovik, 2003). By sharp contrast, Xiao-Gang Wen dismisses the fluid analogy in favor of a “qubit ocean,” where space-time emerges from string-net condensation (Wen, 2004). These are not merely different perspectives; they are mutually exclusive ontologies. If space is a liquid, it is not a net of entangled information, and conversely; yet, both theories “derive” SRT with equal mathematical elegance. This is the very definition of *isostheneia*: arguments of equal weight that cancel each other out.

3. The Agrippan Trilemma in Modern Theory

When professional physicists attempt to ground their specific theory, they inevitably fall into the “Agrippan Trilemma” of Sextus Empiricus, as follows.

- **The Infinite Regress:** Ted Jacobson derives the Einstein field equations from thermodynamics (Jacobson, 1995). Yet, thermodynamics requires a statistical ensemble of “parts.” What are the parts? To explain the parts, one must invoke a deeper layer of physics, which itself requires a substrate, *ad infinitum*.
- **Dogmatism:** To avoid the regress, Gerard ‘t Hooft) must simply assert the existence of a cellular automaton as a “first principle” (‘t Hooft, 2016). This is strictly a dogmatic move; he begins with the lattice because it is the lattice he wishes to find.
- **Circularity:** Holger Bech Nielsen argues for “Random Dynamics,” claiming that relativity emerges from chaos (Nielsen, 1987). However, his definition of “randomness” is carefully curated to ensure it is the *kind* of randomness that yields Lorentz symmetry. The conclusion (relativity) is baked into the premise (the random substrate).

4. The Relational Escape: Crane and Rovelli

Some seek to escape this by moving from “stuff” to “relations.” Louis Crane and Carlo Rovelli argue that the “points” of space-time do not exist; there are only “events” (Crane, 2006; Rovelli, 2017). On this view, SRT is a relational language. Yet, even here, we find the Pyrrhonist’s Tenth Trope: Relativity of the Observer. The “relational” world of a Spin Network looks nothing like the “relational” world of a Categorical geometer. Our “knowledge” of the vacuum remains a function of our chosen mathematical category.

5. Conclusion: Following the Appearances

Against the professional urge to pick a “winner,” the modern Sextus Empiricus remains in a state of *epoché*. We do not deny that SRT works; we “follow the appearances” in our daily calculations while refusing to assent to any claim about what the vacuum *really* is.

As the sun sets over the city, the physicist realizes that whether the vacuum is a superfluid or a qubit-net is, for now, “non-evident” (*adelon*). Tranquility (*ataraxia*) comes not from solving the equation, but from realizing that the equation is just a map—and that we have at least six different, equally flawed maps of a terrain we can never see.

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