

The Gentle Trio Interpretation of the Standard Model, Relativity, and Quantum Mechanics

Terry Bollinger

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<http://backreaction.blogspot.com/2019/02/gian-francesco-giudice-on-future-high.html?showComment=1551055127394#c5984499036188095095>

A Comment on the Backreaction (Sabine Hossenfelder) post:

Gian-Francesco Giudice On Future High-Energy Colliders (February 23, 2019)

<https://backreaction.blogspot.com/2019/02/gian-francesco-giudice-on-future-high.html>

[Terry Bollinger 7:38 PM, February 24, 2019](#)

Mitchell, no disagreements at all! I love the way physics theory has been percolating lately, and I'm actually optimistic that physics is on the verge of a major, 1920s-level inflection point, likely within the next ten years.

My point instead was that current high-level physics funding is based more on habit than strategy. Hotter-Is-Better was a fantastically effective research heuristic for half a century, and was it was pivotal in achieving one of the supreme accomplishments of physics, the 1970s-vintage Standard Model. But from a hard-nosed analysis of results per Euro or dollar spent, Hotter-Is-Better just seemed to lose all of its potency after that. Other issues also arose about that time, including in particular capture of NSF funding by an exceptionally narrow, unusually self-defensive, and experimentally indifferent school of theoretical thought. Even so, after a decade or so of floundering in terms of generating experimentally meaningful new insights, funding at the highest levels should have better reflected the failure of Hotter-Is-Better and allocated more funding towards diversity of analysis.

But apart from the costly final verification of the Higgs component of the Standard Model, why did Hotter-Is-Better seem to fail after 1980?

Here's one thought: Maybe the universe is simply gentler than we thought, and the Standard Model was already pushing the limits of information available in that direction. Similarly, new interpretations of black holes that keep information in touch with the outer universe, such as in 't Hooft's recent papers, at least enable arguments that GR is also gentler than we thought, with event-horizon interpretations making singularities unnecessary. Perhaps the final step in physics is not to make things hotter, but to look for similar softening limits in quantum theory, and then show how all three areas work together in some remarkable and still unknown way.

[Terry Bollinger 6:34 PM, February 25, 2019](#)

Addendum: For completeness, by "gentler" quantum theory I mean observer-dependent QM. This is the idea (my own, apologies, but any related paper refs would be very welcome) that quantum behavior can exist only in the presence of an observer. Observer-dependent QM is gentler because it makes energy-free space truly empty, with field

theory applying only when passing energy or matter makes QFT relevant. Do this right and you get exactly the same field theory observed experimentally. (That assertion is a tautology if you think it through; computer modelers understand this principle well.) However, in observer-dependent QM the vacuum catastrophe problem disappears, since empty regions of space end up with nearly zero energy density due to their lack of significant internal quantum behavior. Philosophically, observer-dependent QM is pretty much the diametric opposite of MWI.

The resulting Gentle Trio is:

- (1) Standard Model Finality: The particles of the Standard Model are already our best representation of reality; we just don't "get" the model well yet. Part of "getting" it will be recognizing that particles and space are deeply interdependent duals of each other, rather than independent entities.
- (2) Dark Mirror General Relativity: The extremes of general relativity lead to particles entering reversibly into momentum space, rather than into singularities.
- (3) Observer-Dependent QM: Like quantum observables, quantum mechanics itself only comes into existence when it is observed -- that is, when it is made relevant by the presence of matter or energy.

In the Gentle Trio, the popular concepts of Planck foam, quantum gravity, and Planck-scale strings would cease to exist. More precisely, such concepts would exist only locally and only through the application of levels of energy likely not available anywhere in the real universe. They would be comparable to patterns of a Mandelbrot dive that is too deep to reach computationally.

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PDF: <https://sarxiv.org/apa.2019-02-23.2113.pdf>