Physics as a branch of poetry

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A recent letter by Tufillaro[1] discusses a thought-provoking question: is physics just a recipe for computing a number? It is easy to argue for the positive. At the end of the day, our experiments can only test the numbers outputted by a model, and therefore we cannot confidently tell whether the model itself is a faithful description of reality. A physicist is then someone who can use recipes to output numbers, which are then matched with experiments.

I believe, however, that this standpoint is a consequence of a limited binary perspective that allows models only to be either pure abstraction or absolute reality. They could, though, be neither. In chapter 3 of his *Physics and Beyond: Encounters and Conversations*, Heisenberg considered the meaning of "understanding" in physics, discussing in what sense topics such as Bohr's atomic model are to be understood. Near the end of the chapter, Heisenberg quoted a conversation with Bohr himself, who stated that "when it comes to atoms, language can be used only as in poetry. The poet, too, is not nearly so concerned with describing facts as with creating images and establishing mental connections."[2] In this context, Bohr was referring to how quantum theory was unusual in its early days, when predictions about atoms had to be made by guessing models from experimental results, as opposed to deriving them from fundamental principles.

Bohr was thinking about the early days of quantum theory, but let us wonder about his comment in a wider domain of physics, without that much regard for quantum or classical. We are then invited to think of the physicist not as a line cook or as a philosopher (to borrow the terms used by Tufillaro), but as a poet. Physics (be it quantum or classical) can be more than following recipes to compute numbers, but still be less than discovering the ontology of the universe. General relativity is experimentally successful because it can output numbers that match several different experiments in several different contexts. Someone who sees the physicist as a philosopher may be tempted to conclude that this means "spacetime is curved" is a statement as true as "Socrates is a man." Someone who sees the physicist as a line cook may be tempted to conclude that we cannot judge whether "spacetime is curved" is a true statement, because physics must limit itself to whether the numbers are correct—that is what the experiments can truly tell! Other "recipes" or models could be just as successful, or even more. Nevertheless, these two perspectives do not exhaust all possibilities. The physicist as a poet sees the success of general relativity as meaning that "spacetime is curved" is a statement akin to Romeo's "Juliet is the sun."

Romeo, of course, does not think Juliet is literally the Sun. Nevertheless, his knowingly false statement still carries truth. Such is the importance of Juliet to him, that no other words would be as fair as stating, directly, that she *is* the Sun. The metaphor highlights truth through falsehood. Does this differ from our perspective on physics? If general relativity has passed through so many tests, can the physicist be blamed for taking the poetic stance and stating that "spacetime is curved," even if none of the experiments tested this particular statement? While future theories may dispute whether "spacetime is curved" is an ontological truth when read literally, the physicist as a poet takes the perspective that the sentence still carries metaphorical truth. Take "the force of gravity follows an inverse-square law," for example. With our present knowledge of relativity, this statement is false when taken at face value. Gravity is not a force. Juliet is not the Sun. However—interjects the bard who studied field theory—inverse-square laws are a hallmark of an interaction mediated by a massless particle, and "Juliet, merely by being, turns darkness into light."[3] So deeper truths hide within the false statements. In a sense, the force of gravity follows an inverse-square law. In a sense, Juliet is the Sun.

Physical models may then not be reality, but are metaphors for reality. While the practice of physics is not enough to fully learn about the ontology of the universe, it may still reach beyond the numbers, and we can hope to fit a bit of reality in a stanza.

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[1]N. Tufillaro, Reflections on a comment by David Griffiths about quantum mechanics, Am. J. Phys. **94**, 263 (2026).
[2]W. Heisenberg, *Physics and Beyond: Encounters and Conversations*, World Perspectives No. 42, translated by A. J. Pomerans (Harper & Row, New York, NY, 1971), p. 41.
[3]W. Shakespeare, *Romeo and Juliet*, edited by R. Weis, The Arden Shakespeare Third Series (Bloomsbury, London, 2012), p. 185.