Dispensing with the Philosophical Baggage of Traditional Quantum Mechanics

To the Editor:

I would like to comment on the description of quantum mechanics in the very interesting article "Emerging Insights on Limitations of Quantum Computing Shape Quest for Fast Algorithms" (Sara Robinson, *SIAM News*, Vol. 36, No. 1, January/February 2003). The article makes the following statements:

"But in the weird world of quantum physics, the state of the electron is not just high or low but a weighted combination of the two: what physicists call a "superposition" of classical states."

"According to the theory of quantum mechanics, the act of observing a quantum state jars it out of its delicate superposition, collapsing it into a classical state with probability that's the square of the amplitude of the classical state."

"Quantum algorithms make use of the elusive phenomenon known as quantum entanglement, mysterious correlations between particles that cannot be explained by classical physics."

While statements like these are commonplace in discussions of quantum mechanics, I fear they are due to illogical thinking on the part of many physicists. They are not forced upon us by an impartial evaluation of the experimental evidence, but rather are the result of the philosophical biases of Bohr and his followers.

Bohmian mechanics is a theory that dispenses with all the philosophical baggage of traditional quantum mechanics. It provides a clear, logical, and precise, albeit nonclassical, description and ontology of the (nonrelativistic) world. Not only does it agree with the experimental evidence, but it is an antidote to the muddle of traditional explanations of quantum mechanics. For these reasons, mathematicians should find it particularly appealing.

For more information, I suggest the following sources:

LETTERS TO THE EDITOR

- D.Z. Albert, *Quantum Mechanics and Experience*, Harvard University Press, Cambridge, Massachusetts, 1992.
- J.S. Bell, *Speakable and Unspeakable in Quantum Mechanics*, Cambridge University Press, Cambridge and New York, 1987.
- Bohmian Mechanics, *Stanford Encyclopedia of Philosophy*, http://plato.stanford.edu/entries/qm-bohm/.
- E-mail correspondence between Sheldon Goldstein and Steven Weinberg on Bohmian mechanics, http://www.mathematik.uni-muenchen.de/~bohmmech/BohmHome/bmstartE.htm.
- Sheldon Goldstein's home page and articles posted there, http://math.rutgers.edu/~oldstein/.
- T. Maudlin, *Quantum Non-Locality and Relativity: Metaphysical Intimations of Modern Physics*, Blackwell, Oxford and Cambridge, 1994.

—David Marcus, Northrop Grumman Information Technology, Reading, Massachusetts.