▸ S. BARRY COOPER, *Definability in the Real Universe.*
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A basic problem for many scientific areas, and between areas, is extracting computational content from the interface between local and global phenomena. Related concepts are those of phase transitions, emergence, strange attractors, supervenience, decoherence, and nonlocality. We argue that one can bring precision and clarity to the discussion of such topics via the mathematical theory of definability and invariance. And modelling physical interactions in terms of Turing reductions over the reals one can begin to close the gap between process and algorithm, and enable an analysis of the computability of many previously puzzling aspects of nature.

In particular, current physical theory contains a number of gaps, hypotheses and speculative theories - as involved in many worlds interpretations of quantum decoherence - which can benefit from such a mathematical analysis. And at the other end of the spectrum, even the concept of supervenience, which has provided workspace for a number of approaches to reconciling physical and mental relations, can be given a clarifying mathematical content.

The setting for all this will depend on an appropriately general modelling of causal structure in nature, and will be related to standard computability-theoretic notions.