Abstract Submitted
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Quantum physics and complex networks[1] JACOB BIAMONTE, ISI Foundation — There is a widely used and successful theory of "chemical reaction networks," which provides a framework describing systems governed by mass action kinetics. Computer science and population biology use the same ideas under a different name: "stochastic Petri nets." But if we look at these theories from the perspective of quantum theory, they turn out to involve creation and annihilation operators, coherent states and other well-known ideas—yet in a context where probabilities replace amplitudes. I will explain this connection as part of a detailed analogy between quantum mechanics and stochastic mechanics which we've produced several results on recently [1, 2, 3], including the recent analytical results uniting quantum physics and complex networks [2]. Our general idea is about merging concepts from quantum physics and complex network theory [1, 2, 3, 4] to provide a bidirectional bridge between both disciplines.

[1] Quantum Techniques for Stochastic Mechanics, 235 pages, arXiv:1209.3632 (2012);
[2] Degree Distribution in Quantum Walks on Complex Networks, Phys. Rev. X 3, 041007 (2013);
[3] Quantum Transport Enhancement by Time-Reversal Symmetry Breaking, Sci. Rep. 3, 2361 (2013);
[4] Community Detection in Quantum Complex Networks, arXiv:1310.6638 (2013).

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