Title:	Construction of logic gates exploiting resonance phenomena in nonlinear systems
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Abstract:	A two-state system driven by two inputs has been found to consistently produce a response mirroring a logic function of the two inputs, in an optimal window of moderate noise. This phenomenon is called logical stochastic resonance (LSR). We extend the conventional LSR paradigm to implement higher-level logic architecture or typical digital electronic structures via carefully crafted coupling schemes. Further, we examine the intriguing possibility of obtaining reliable logic outputs from a noise-free bistable system, subject only to periodic forcing, and show that this system also yields a phenomenon analogous to LSR, termed Logical Vibrational Resonance (LVR), in an appropriate window of frequency and amplitude of the periodic forcing. Lastly, this approach is extended to realize morphable logic gates through the Logical Coherence Resonance (LCR) in excitable systems under the influence of noise. The results are verified with suitable circuit experiments, demonstrating the robustness of the LSR, LVR and LCR phenomena.
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