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When the dynamical writing of coupled memories with reinforcement learning meets physical bounds

Traditionally, memory writing operations proceed one bit at a time, limiting the storage capacity of materials. A way to overcome this limitation would be to write several bits at once. Although quasi-static operations are typically used for bits manipulation, they are known to reduce the memory capacity of a system. To address this issue, we introduce a model framework for dynamical memory manipulation based on a multi-stable chain of coupled bi-stable spring-mass systems. We show that, using a Reinforcement Learning agent, we can control this highly nonlinear system in force, driving it from any stable or random configuration to any other. Notably, by taking advantage of the underlying physics, the agent shares insightful knowledge by pointing to an optimal system design.

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