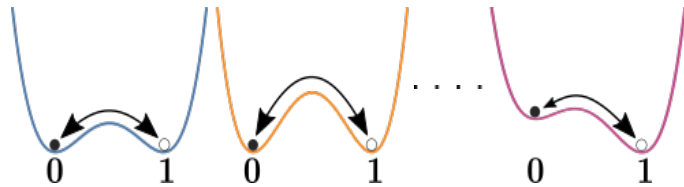
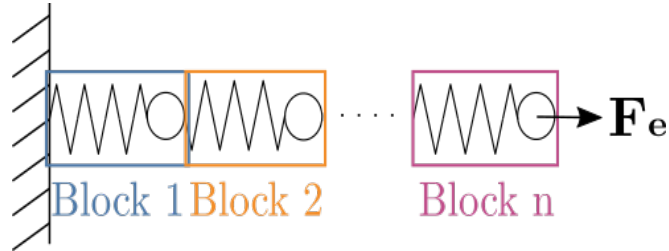


When the dynamical writing of coupled memories with reinforcement learning meets physical bounds

Laura Michel, Frédéric Lechenault

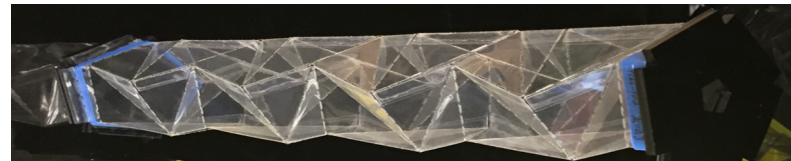
Studied system



Chain of coupled bi-stable spring-mass units

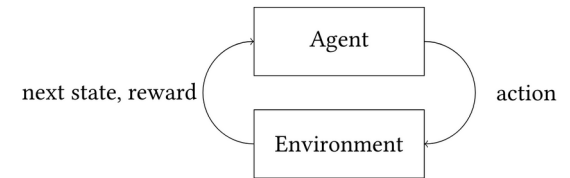
Motivation

- Model for materials supporting several crystallographic phases
- **Mechanical memory system** for stocking
- Traditionally, **quasi-static operations**, known to **reduce the memory capacity of the system**, are used for bits manipulation



Théo Jules, Austin Reid, Karen E. Daniels, Muhittin Mungan, and Frédéric Lechenault. Delicate memory structure of origami switches. *Phys. Rev. Research*, 4, 2022.

Control using RL

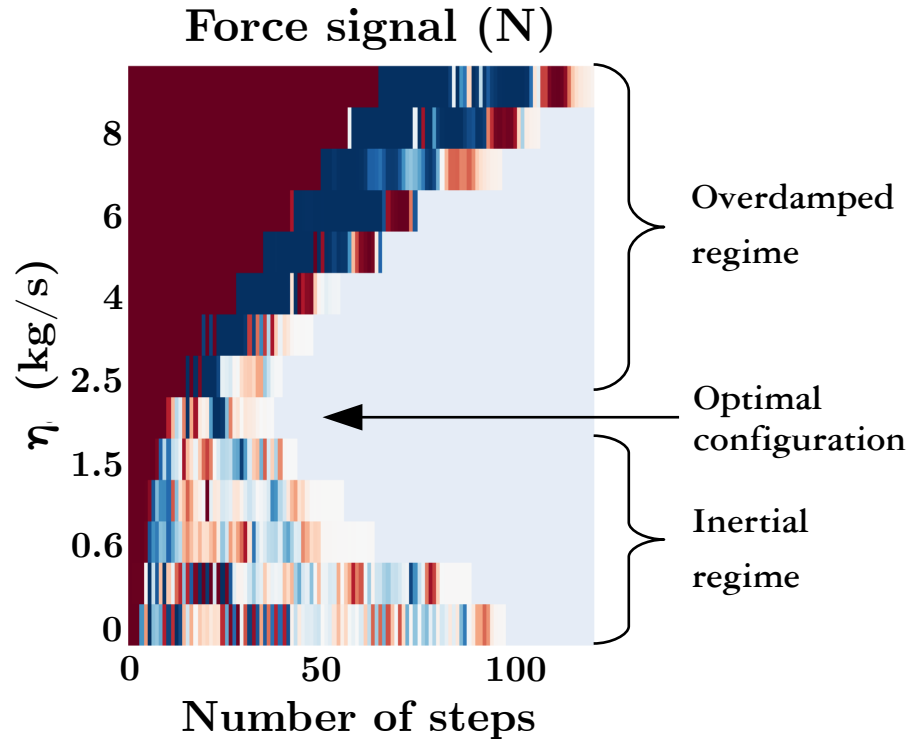


- RL allows to **control dynamically** the multi-stable chain, **restoring the memory capacity** of the system to its full potential

The RL agent shares insightful knowledge

Different strategies for different regimes

The optimal configuration can be physically understood balancing inertia and dissipation



$$\eta_c \sim m^{1/2} k^{1/6} F_{\max}^{1/3}$$

