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Pointer state engineering in open quantum systems[1] LORENZA VIOLA, KAVEH KHODJASTEH, Dartmouth College, VIATCHESLAV DOBROVITSKI, Ames Laboratory — Pointer states have a long history in fundamental quantum theory and a practical relevance as long-lasting high-fidelity states in open quantum systems. For generic dissipative dynamics, however, pointer states need not exist or, when they do, need not coincide with states of interest. I will show how open-loop control procedures may be used to engineer dissipation in such a way that any desired initial pure state can be guaranteed to survive with high minimum fidelity over time and retrieved on demand. Quantitative fidelity bounds and constructive control protocols will be presented, and validated through simulation in paradigmatic single- and two- qubit dissipative scenarios. I will also argued that the state selectivity observed in recent dynamical decoupling experiments can be naturally understood within the pointer state engineering framework.

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Lorenza Viola
Dartmouth College

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