

Constrained dynamics via the Zeno effect in quantum simulation: Implementing non-Abelian lattice gauge theories with cold atoms

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We show how engineered classical noise can be used to generate constrained Hamiltonian dynamics in atomic quantum simulators of many-body systems, taking advantage of the continuous Zeno effect. After discussing the general theoretical framework, we focus on applications in the context of lattice gauge theories, where imposing exotic, quasi-local constraints is usually challenging. We demonstrate the effectiveness of the scheme for both Abelian and non-Abelian gauge theories, and discuss how engineering dissipative constraints substitutes complicated, non-local interaction patterns by global coupling to laser fields.

- [QIPC](#) [2]
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- [SIQS](#) [4]
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