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New Gauge Invariant in Time-dependent Quantum Degenerate Systems CHAO XU, JIANDA WU, CONGJUN WU[1], University of California, San Diego — Quantum dynamical systems have recently received a great deal of attentions, including Floquet, time crystal, and quench problems. Here we present a new non-Abelian gauge invariant which, being a substantial generalization of its Abelian counterpart, emerges in generic time-dependent quantum systems with degenerate instantaneous eigenstates. Its geometric features are demonstrated to play an important role in understanding the topological structure in time-dependent systems. Furthermore, a concrete Hamiltonian is constructed to explicitly demonstrate how the new invariant influences the time evolution in time-dependent systems. The new invariant could be tested by cold Atoms experiments in relevant systems.

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