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Fidelity of adiabatic holonomic quantum gates VLADIMIR MALINOVSKY, SERGEY RUDIN, US Army Research Laboratory, Adelphi, MD 20783 — During last few years non-Abelian geometric phases are attracting increasing interest due to possible experimental applications in quantum computation. Here we discuss universal set of holonomic quantum gates using the geometric phase that the qubit wave function acquires after a cyclic evolution. The proposed scheme utilizes ultrafast pulses and provides a possibility to substantially suppress transient population of the ancillary states. Fidelity of the holonomic quantum gates in the presence of dephasing and dissipation is discussed. Example of electron spin qubit system in the InGaN/GaN, GaN/AlN quantum dot is considered in details.

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