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**Optimal Diabatic Dynamics of Majorana-based Topological Qubits**<sup>1</sup> BABAK SERADJEH, Indiana University, ARMIN RAHMANI, Western Washington University, MARCEL FRANZ, University of British Columbia — In topological quantum computing, unitary operations on qubits are performed by adiabatic braiding of non-Abelian quasiparticles such as Majorana zero modes and are protected from local environmental perturbations. This scheme requires slow operations. By using the Pontryagin's maximum principle, here we show the same quantum gates can be implemented in much shorter times through optimal diabatic pulses. While our fast diabatic gates do not enjoy topological protection, they provide significant practical advantages due to their optimal speed and remarkable robustness to calibration errors and noise.

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Armin Rahmani  
Western Washington University

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