

Abstract Submitted  
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**Boosting Majorana zero modes** GIL REFAEL, TORSTEN KARZIG, Caltech, FELIX VON OPPEN, FU Berlin — When Majorana bound states are driven at high speeds, competing processes may destroy quantum coherence. To study this regime we exploit an effective Lorentz invariance of a generic Majorana supporting Hamiltonian to obtain an exact solution of the domain wall bound states for arbitrary velocities. An effective 'speed of light' emerges, which acts as an absolute speed limit for braiding Majorana states. We also use our exact solutions to study further restrictions on the domain wall motion due to the presence of static impurities in the system. Looking beyond the context of topological quantum computing, our insights and analysis can also be viewed as theoretical basis for creating extreme relativistic phenomena, such as the Unruh effect, in solid state systems.

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