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Floquet generation of Majorana edge modes and topological invariants[1] DIPTIMAN SEN, MANISHA THAKURATHI, Indian Institute of Science, Bangalore, India, AAVISHKAR PATEL, Harvard University, Cambridge, Massachusetts, USA, AMIT DUTTA, Indian Institute of Technology, Kanpur, India, KRISHNENDU SENGUPTA, Indian Association for the Cultivation of Science, Kolkata, India — We show that periodic driving of one of the parameters in the Hamiltonian of a system can produce Majorana modes at its edges. The systems studied include a p-wave superconducting wire and the Kitaev model on the honeycomb lattice. For the wire, we show that periodic δ-function kicks of the on-site potential can produce a number of Majorana modes at the two ends; these modes can appear or disappear as the driving frequency is varied. The end modes correspond to eigenvalues of the Floquet operator equal to ± 1. Using Floquet theory for the bulk, we derive a topological invariant which correctly predicts the number of these modes as a function of the frequency and the Floquet eigenvalue. We also discuss the generation of end modes by periodic kicking of the hopping and superconducting terms. For the Kitaev model, we derive the phase diagram where Majorana edge modes appear on zigzag and armchair edges. We then show that if one of the couplings is given periodic δ-function kicks, modes can appear on some edges even when the corresponding equilibrium Hamiltonian has no modes on those edges. The Floquet theory of the bulk can again be used to predict the frequencies at which edge modes appear or disappear for different values of the momentum of the modes.

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