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## Constant sign and sign changing NLS ground states on noncompact metric graphs

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We investigate existence and nonexistence of positive and nodal action ground states for the nonlinear Schrödinger equation on noncompact metric graphs with rather general boundary conditions. For noncompact graphs with finitely many edges, we detect purely topological sharp conditions preventing the existence of ground states or of nodal ground states. We also investigate analogous conditions of metrical nature. The negative results are complemented by several sufficient conditions to ensure existence, either of topological or metrical nature, or a combination of the two. For graphs with infinitely many edges, all bounded, we focus on periodic graphs and infinite trees. In these cases, our results completely describe the phenomenology.

Furthermore, we study nodal domains and nodal sets of nodal ground states and we show that the situation on graphs can be totally different from that on domains of  $\mathbb{R}^N$ .

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