

Abstract Submitted
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Topological Phases of Inhomogeneous Superconductivity SILAS HOFFMAN, JELENA KLINOVAJA, DANIEL LOSS, University of Basel — We theoretically consider the effect of a spatially periodic modulation of the superconducting order parameter on the formation of Majorana fermions induced by a one-dimensional system with magnetic impurities brought into close proximity to an *s*-wave superconductor. When the magnetic exchange energy is larger than the inter-impurity electron hopping we model the effective system as a chain of coupled Shiba states. While in the opposite regime, the effective system is accurately described by a quantum wire model. Upon including a spatially modulated superconducting pairing, we find, for sufficiently large magnetic exchange energy, the system is able to support a single pair of Majorana fermions with one Majorana fermion on the left end of the system and one on the right end. When the modulation of superconductivity is large compared to the magnetic exchange energy, the Shiba chain returns to a trivially gapped regime while the quantum wire enters a new topological phase capable of supporting two pairs of Majorana fermions.

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