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Phase-engineering artificial topology in a three-terminal Josephson interferometer. SOPHIE D'AMBROSIO, FRANCESCO VISCHI, ELIA STRAMBINI, FRANCESCO GIAZOTTO, NEST laboratory, GIAZOTTO GROUP TEAM — The fundamental aspects of Majoranas with their non-Abelian statistics offer great applications for the future of quantum computation. Current theories on multi-terminal Josephson junctions emphasize the possibility of engineering non trivial states in the spectrum of a proximized normal metal giving rise to an artificial topological superconductor which is able to support Majorana bound states, and points out the importance of a first experimental agreement with the theoretical speculations [1,2]. Here we report on the realization of a three-terminal Josephson interferometer based on proximity effect and fully controlled by phase-coherence. Our device shows a non trivial phase-tunable switch from a regime where the normal metal spectrum shows a gap in the density of states to a gapless regime in full agreement with recent predictions [1,2,3,4], and represents the first essential step towards phase engineering of an artificial topological superconductor hosting Majorana bound states. [1] arXiv:1508.00146. [2] arXiv:1503.06862. [3] Phys. Rev. B 90, 155450 (2014). [4] arXiv:1508.03289.

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