Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

**Topological Massive Dirac Edge Modes and Long-Range Superconducting Hamiltonians** OSCAR VIYUELA, Universidad Complutense de Madrid, DAVIDE VODOLA, GUIDO PUPILLO, Universite de Strasbourg and CNRS, MIGUEL ANGEL MARTIN-DELGADO, Universidad Complutense de Madrid — We discover novel topological effects in the one-dimensional Kitaev chain modified by long-range Hamiltonian deformations in the hopping and pairing terms. This class of models display symmetry-protected topological order measured by the Berry phase of the ground state and the winding number of the Hamiltonians. For exponentially-decaying hopping amplitudes, the topological sector can be significantly augmented as the penetration length increases, something experimentally achievable. For power-law decaying superconducting pairings, the massless Majorana modes at the edges get paired together into a massive non-local Dirac fermion localised at both edges of the chain: a new topological quasiparticle that we call topological massive Dirac fermion. This topological phase has fractional topological numbers as a consequence of the long-range couplings. Possible applications to current experimental setups and topological quantum computation are also discussed.

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Date submitted: 17 Nov 2015 Electronic form version 1.4