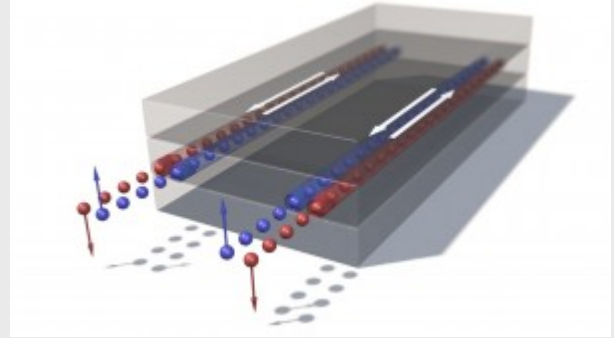


## Transport spectroscopy of NS nanowire junctions with Majorana fermions

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ABSTRACT:

We investigate transport through normal-superconductor nanowire junctions in the presence of spin-orbit coupling and magnetic field. As the Zeeman field crosses the critical bulk value  $B_c$  of the topological transition, a Majorana bound state (MBS) is formed, giving rise to a sharp zero-bias anomaly (ZBA) in the tunneling differential conductance. We identify novel features beyond this picture in wires with inhomogeneous depletion, like the appearance of two MBSs inside a long depleted region for  $B < B_c$ . The resulting ZBA is in most cases weakly split and may coexist with Andreev bound states near zero energy. The ZBA may appear without evidence of a topological gap closing. This latter aspect is more evident in the multiband case and stems from a smooth pinch-off barrier. Most of these features are in qualitative agreement with recent experiments Mourik *et al.*, *Science* 336, 1003 (2012). We also discuss the rich phenomenology of the problem in other regimes that remain experimentally unexplored.