

## Probing helical vs chiral character of topological superconductors via non-local Hanbury-Brown and Twiss correlations

Hanbury Brown and Twiss (HBT) correlations and the non-local differential conductance show the distinct character of helical and chiral superconductors as well as their difference from non-topological superconductors. Topological nature of unconventional superconductors can be clearly distinguished regardless of the setup whether symmetric, non-local or asymmetric by observing HBT correlations. Our chosen model is a generic model to study non-local shot noise cross-correlations. Experimentally, it has been seen that this model, which is metal/superconductor/metal, is easy design and bias voltages can be easily tuned. Probing helical and chiral superconductor is significant because at metal-chiral superconductor junctions stable Majorana bound states (MBS), which persist even in presence of magnetic field have been predicted to occur that will help even in the search for stable MBS, which have potential importance in topological quantum computation. Further, motivation for our work arises from inconsistency in previous experiments which have probed the different topological and non-topological pairing symmetries via Knight shift or scanning SQUID microscopy.

Knight shift measurement do not resolve the helical versus chiral dichotomy. We propose HBT correlation based tests that will give an easy way out for experimentalists to distinguish non-topological superconductors from both chiral-p, chiral-d as well as from helical-p topological superconductors. This additional approach to distinguish the different pairing symmetries in unconventional superconductors is via HBT correlations and non-local conductance with change in barrier strength as well as bias voltages, with simple expressions in the fully transparent as well as tunneling limit for shot noise in the small bias voltage regime too.

[1] Probing helical vs chiral character of topological superconductors via non-local Hanbury-Brown and Twiss correlations, T. Mohapatra, S. Pal and C. Benjamin, arXiv:2103.14920.