

Local and nonlocal shot noise in high- T_c superconducting nanowires

Linda E. Reichl and Corey Ostrove

University of Texas at Austin, Physics Department, 1 University Station, Austin, 78712, USA

We obtain exact expressions for the local current and shot noise and the nonlocal shot noise in the first propagating channel of an NSN (normal-superconducting-normal) nanowire. Using high- T_c cuprate superconductors (HTS) as our model systems we utilize a scattering theory approach to derive the scattering matrix for the systems in the high transparency limit and without the Andreev approximation. The local current and shot noise spectrum is calculated and plotted. In view of recent work in the area of cooper-pair splitting (CPS) devices, we investigate the nonlocal shot noise and relate the behavior of the noise as we change parameters such as the system size, the orientation of the order parameter and the biasing of the junction in the HTS NSN system. The nonlocal shot noise show bunching between electrons and holes that emerge from apposite sides of the superconducting segment.

- [1] Corey Ostrove and L.E. Reichl, *Physica B: Condensed Matter*, **561**, 79 (2019).
- [2] J.A. Celis Gil, S. Gomez P., W.J. Herrera, *Solid State Commun.* **258**, 25 (2017).
- [3] M. Veldhorst and A. Brinkman, *Phys. Rev. Lett.* **105**, 107002 (2010).
- [4] P. Burset, W.J. Herrera, and A. Levy Yeyati, *Phys. Rev. B* **84**, 115448 (2011).
- [5] J. Schindele, A. Baumgartner, and C. Schönenberger, *Phys. Rev. Lett.* **109**, 157002 (2012).
- [6] L. Hofstetter, S. Csonka, J. Nygard, and C. Schönenberger, *Nature Lett.* **461**, 960 (2009).