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Topological Materials Science Seminar (96)

Revealing Majorana bound states properties with electronic transport in three terminal devices

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Place: 6F Seminar Room, IMR 3rd BLDG.
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Time: 14:00-15:00

Abstract:
Majorana bound states are quasiparticles with exceptional properties, which should appear at the boundaries of one-dimensional topological superconductors wires. The clear-cut experimental identification of these Majorana bound states in transport measurements still poses experimental challenges. In this talk, I will show that using three terminal devices out-of-equilibrium, and measuring transport properties like current and noise allow to get original signature demonstrating the Majorana bound states properties. I will first consider a junction where a topological superconductor (TS) wire is connected to two biased normal leads, and show that the sign of the current correlations is directed related to the presence of a Majorana bound state. Then I will consider a similar junction made of three TS wires. There I will show that the effective zero-energy Majorana state formed at the junction of the three TS wires is directly responsible for giant shot noise amplitudes, in particular at low voltages and for small contact transparency.

References:
- T. Jonckheere, J. Rech, A. Zazunov, R. Egger, and T. Martin, Phys. Rev. B 95, 054514 (2017)
- T. Jonckheere, J. Rech, A. Zazunov, R. Egger, A. Levy Yeyati, and T. Martin, Phys. Rev. Lett. 122, 097003 (2019)

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