Random-matrix theory and stroboscopic models of topological insulators and superconductors

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Stellingen

behorende bij het proefschrift

Random-matrix theory and stroboscopic models of topological insulators and superconductors

1. The p-th cumulant of the N-mode conductance of a chaotic Andreev billiard is independent of the topological invariant for $p < N$.
   Chapter 3

2. Half-integer conductance quantization is a smoking-gun signature of Majorana zero-energy modes.
   Chapter 4

3. The quantum Hall phase transition can be studied in one spatial dimension.
   Chapter 6

4. Electrons on the surface of a topological insulator provide a condensed-matter application of both special and general relativity.
   Chapter 8

5. The determinant of the reflection matrix of a superconductor is a topological invariant.
   A. R. Akhmerov, J. P. Dahlhaus, F. Hassler, M. Wimmer, and C. W. J. Beenakker, Phys. Rev. Lett. **106**, 057001 (2011)

6. The expression $I = (2e/\hbar)dE/d\phi$ for the phase-dependent supercurrent $I(\phi)$ carried by a Majorana state of energy E, used in most papers on the topic, is wrong by a factor of two.
   C. W. J. Beenakker, D. I. Pikulin, T. Hyart, and J. P. Dahlhaus, arXiv:1210.5412

7. Because weak (anti-)localization is not destroyed by a magnetic field in the presence of Andreev reflection, it cannot be categorically ruled out as an explanation for the zero-bias conductance peak attributed to Majorana fermions.
   D. I. Pikulin, J. P. Dahlhaus, M. Wimmer, H. Schomerus, and C. W. J. Beenakker, arXiv:1206.6687

8. Nanowires that are narrower than the spin-orbit coupling length can support more than a single zero-energy mode at each end.
   M. Diez, J. P. Dahlhaus, M. Wimmer, and C. W. J. Beenakker, Phys. Rev. B **86**, 094501 (2012)

9. Piano improvisation is like the day-to-day decision making process of a manager – more intuitive than rational, built on experience.

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