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Signatures of Majorana zero-modes in nanowires, quantum spin Hall edges, and quantum dots

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Stellingen

behorend bij het proefschrift

*Signatures of Majorana zero-modes in nanowires,
quantum spin Hall edges, and quantum dots*

1. A soft superconducting gap in a nanowire can coexist with a midgap Majorana bound state at the end points.
Chapter 2
2. A magnetic insulator is not needed to confine a Majorana fermion at the quantum spin Hall edge.
Chapter 3
3. A conductance peak pinned to zero voltage over an extended magnetic field range is not a smoking gun for the presence of a Majorana zero-mode.
Chapter 5
4. The 2π winding of the superconducting phase around a magnetic vortex can be mimicked by a multi-terminal Josephson junction, with a minimum of three terminals.
Chapter 6
5. *Propagating* Majorana fermions in superconductors were first produced in 1911.
H. Kamerlingh Onnes, Commun. Phys. Lab. Univ. Leiden **12**, 120 (1911).
6. The exchange statistics of Majorana bound states can be detected without actually moving them.
7. The insensitivity to elevated temperatures of the “giant” negative magnetoresistance of oxide interfaces points to a classical mechanical origin.
M. Diez et al., arXiv:1412.5614.
8. An Andreev level that is pushed through the Fermi level very slowly emits a Bogoliubov quasiparticle with quantized charge $\pm e$.
9. Humor provides the highest cross-cultural barrier to understanding.

Shuo Mi
Leiden, 22 april 2015