# Anyonic, cosmic, and chaotic: three faces of Majorana fermions

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# Stellingen

behorende bij het proefschrift

*Anyonic, cosmic, and chaotic: three faces of Majorana fermions*

1. A vanishing fermion parity in a superconductor fusion experiment can not become a distinctive signature of an isolated Majorana zero-mode. [chapter 2].

2. The absence of quasiparticles in SYK model manifests itself in a linear in temperature dependence of the tunneling current between it and the fermion bath. [chapter 5].

3. Many-body effects in the nano-device present in the experimental setup for the relic neutrino detection impose fundamental intrinsic limitation on its energy resolution. [chapter 6].

4. The detection of relic neutrinos in the $\beta$-decay spectrum of $^{3}$H is fundamentally impossible. The only viable isotope for neutrino detection is $^{171}$Tm. [chapter 7].

5. Any gauge-invariant lattice theory of Dirac fermions which preserves chiral symmetry must have a vanishing topological index.

6. Entanglement entropy is not a good measure of the complexity of the fermionic system.

7. There is a $k$-body basis independent measure of fermionic complexity $C(k)$ that is zero for a product state, exponentially decreasing for a Fermi liquid state and $\delta(k - k^*)$ with $k^* \propto$ volume of the system for a chaotic state.

8. If one couples two fermionic systems, their internal energies will grow at timescales of the Fermi time $\tau_F \sim 1/\varepsilon_F$ independently of their initial temperatures.

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