



Universiteit  
Leiden  
The Netherlands

## On periodically driven quantum systems

Tarasinski, B.M.

### Citation

Tarasinski, B. M. (2016, September 20). *On periodically driven quantum systems. Casimir PhD Series*. Retrieved from <https://hdl.handle.net/1887/43150>

Version: Not Applicable (or Unknown)

License:

Downloaded from: <https://hdl.handle.net/1887/43150>

**Note:** To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/43150> holds various files of this Leiden University dissertation.

**Author:** Tarasinski, B.M.

**Title:** On periodically driven quantum systems

**Issue Date:** 2016-09-20

# Stellingen

behorende bij het proefschrift  
*On periodically driven quantum systems*

1. Unlike their static counterparts, the bulk topological properties of one-dimensional periodically driven quantum systems are characterized by *two* (not one) independent invariants.  
Chapter 2
2. The two invariants of a chiral symmetric driven system are the winding numbers on a torus of half the Floquet operator.  
Chapter 3, thesis cover
3. In an open driven quantum system, topological boundary states can actively trap particles from the bulk.  
Chapter 4
4. The magnetic-field dependent relaxation time  $\tau_B$  for weak localization in a nanowire with a hexagonal cross-section depends on the width  $W$  with a non-integer exponent,  $\tau_B \propto W^{-\gamma}$ ,  $\gamma = 3.174 \pm 0.003$ , hinting to hidden fractal properties of electron dynamics in that geometry.  
Chapter 6
5. The full density matrix simulation of the Surface-17 quantum error correction code, requiring thousands of CPU hours as reported by Tomita & Svore [PRA **90**, 062320 (2014)], can be reproduced in a few hours on a single GPU.  
<https://github.com/brianzi/quantumsim>
6. The computational universality of continuous-time quantum walks [Childs, PRL **102**, 180501 (2008)] is of little practical use, because one would need a universal quantum computer to produce the quantum walk in the first place.
7. The construction of “Majorana bound states in non-topological superconductors” described by San Jose et al. [Sci. Rep. **6**, 21427 (2016)] relies not only on charge-conjugation symmetry but also on chiral symmetry.
8. The runtime of a sufficiently accurate decoding algorithm based on minimal-weight matching for the surface code [Fowler et al., PRA **86**, 042313 (2012)] will be dominated not by the matching subroutine, but by the subroutine for weight calculation, especially for low-distance codes.

Brian Tarasinski  
20 september 2016