

# Finite-size DMRG characterization of the 1D Fermi-Hubbard model phase diagram

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## Abstract

The one-dimensional Fermi-Hubbard model at zero temperature is studied, employing finite-size DMRG algorithm to investigate some of its ground state properties. The model contains a hopping term between neighbouring sites, a finite on-site interaction energy, and a chemical potential. [To be continued...]

The entire project heavily relies upon the precedent project carried out by the author together with Marco Pompili, where the 1D Bose-Hubbard model was studied using finite-size DMRG. You may find [at this link](#) our previous work.

All of the code can be found at open-access in [this repository](#):  
<https://github.com/nepero27178/FermiHubbardDMRG>

## Contents

<b>1</b>	<b>Theoretical introduction</b>	<b>2</b>
1.1	Bosonization . . . . .	2
1.2	The Fermi-Hubbard model . . . . .	2
1.3	Adding one effective interaction . . . . .	2
<b>2</b>	<b>Algorithms and simulations</b>	<b>2</b>
2.1	Finite-size DMRG . . . . .	2
<b>3</b>	<b>Data analysis and results</b>	<b>2</b>

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# **1 Theoretical introduction**

[To be continued...]

## **1.1 Bosonization**

[To be continued...]

## **1.2 The Fermi-Hubbard model**

[To be continued...]

## **1.3 Adding one effective interaction**

[To be continued...]

# **2 Algorithms and simulations**

[To be continued...]

## **2.1 Finite-size DMRG**

[To be continued...]

# **3 Data analysis and results**

[To be continued...]