

Simulating Collisional Dark Matter

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Chapter 1

Introduction

1.1 The Boltzmann Equation

1.2 Mesoscopic Modeling

Traditionally, fluid dynamics have been modeled using the Navier-Stokes equation, or some modification of it.

1.3 Lattice Automata and Lattice Boltzmann

1.4 BGK Approximation

Chapter 2

The Lattice Boltzmann Algorithm

2.1 The Mass Integral and the Poisson Equation

asdfasdf

2.2 Kick and Drift

asd

2.3 The Collisional Step

asd

2.4 Units and Initial Conditions

Chapter 3

Results

3.1 No Collisional

3.2 $\tau = 10$

3.3 $\tau = 100$

3.4 $\tau = 250$

3.5 $\tau = 500$

3.6 $\tau = 1000$

Chapter 4

Conclusions

4.1 A Numerically Stable Simulation