Department of Physics
Ludwig-Maximilians-University Munich

Master Thesis in Physics
submitted by

Robin Eberhard
born in Aalen, Germany

handed in on

October 16, 2020

Spin selective imaging of ground state potassium atoms

This Bachelor Thesis has been carried out by Robin Eberhard at the
Physics Institute in **Munich**
under the supervision of
Prof. Dr. Christian Gross

Spin selective imaging of ground state potassium atoms

Robin Eberhard

Abstract Abstract

Zusammenfassung Abstract

Contents

1 Introduction

2 Motivation

3 Theory of light modulation

3.1 Electro-optical modulators

3.1.1 Chopping in the experiment

3.1.2 Bergmann pockels cell driver

3.2 Acousto-optical deflectors

3.2.1 Operation

3.2.2 Usage in the experiment

4 Sorting of atoms

4.1 Motivation

4.2 Algorithms

4.2.1 Pathfinding

4.2.2 Compression

4.3 Implementation

4.3.1 Spectrum M4i 66xx

5 Spin-selective imaging

5.1 Approaches

5.1.1 Zeemann induced potential separation

5.1.2 Utilization of magic wavelengths

5.2 Setup

5.2.1 Schematics

5.2.2 Cavity classification

6 Conclusion

List of Figures

Statement of Authorship

I herewith declare that this thesis was solely composed by myself and that it constitutes my own work unless otherwise acknowledged in the text. I confirm that any quotes, arguments or concepts developed by another author and all sources of information are referenced throughout the thesis. This work has not been accepted in any previous application for a degree.

Munich, October 16, 2020

Signature