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Dr. Committee Chair
Professor

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Dr. External Member
Assistant Professor

TITLE FIRST PART

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A Dissertation Presented to the Graduate Faculty of the

Dedman College

Southern Methodist University

in

Partial Fulfillment of the Requirements

for the degree of

Doctor of Philosophy

with a

Major in Physics

by

Graduate Student

B.S., Physics, Undergraduate University
M.S., Physics, Southern Methodist University

May 1, 2019

Acknowledgments

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Student, Graduate

B.S., Physics, Undergraduate University
M.S., Physics, Southern Methodist University

Title first part

continued title

last part of title

Advisor: Dr. Advisor Name

Doctor of Philosophy degree conferred May 1, 2019

Dissertation completed January 1, 2019

Abstract text goes here. Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Dedication text goes here.

The following is a summary of useful concepts in high energy particle physics.

0.1. Units

Discussion of units

0.2. Coordinates

Large Hadron Collider (LHC) coordinate systems

0.3. Statistics

Statistics in particle physics

Introduction

This is the first chapter of the thesis. [1, 2]
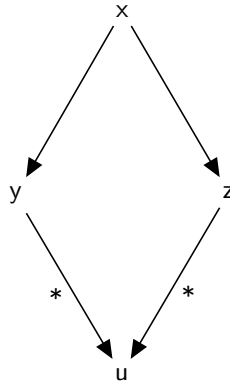
1.1. Creating Figures

Figure 1.1: This is a placeholder figure to act as an example. Here we cite a new reference in the caption to demonstrate that given the package configuration our order of references will not be distributed by the table of contents [3].

As can be seen in Figure 1.2, the subfigures are independent of each other such that Figure 1.2a and Figure 1.2b can be accessed separately.

As an example of an equation formatted in "display style" the equation for the fiducial cross section from [1] is reproduced as Equation 1.1:

$$\sigma_{\mathrm{inel}}^{\mathrm{fid}}\left(\zeta > 10^{-6}\right) = \frac{N - N_{\mathrm{BG}}}{\epsilon_{\mathrm{trig}} \times \mathcal{L}} \times \frac{1 - f_{\zeta < 10^{-6}}}{\epsilon_{\mathrm{sel}}} \tag{1.1}$$

1.2. Creating Tables

(a) This is the first figure of two, in this example, and its own independent subfigure.

(b) As the `t` alignment option was chosen for the subfigures, they are still properly aligned vertically even though this caption is longer.

Figure 1.2: An example of a figure that consists of two subfigures.

To create tables in LaTeX it is highly recommended to use the `booktabs` package. It allows for very elegant and clean table creation, such as Table 1.1. If you want to create a table quickly, or have a CSV file that you'd like to quickly turn into a table there are various online LaTeX table generators.

Table 1.1: Common quantities in particle physics given in both natural units and SI units.

Quantity	Natural Units	Natural Units (dimensionful)	SI Units
Speed	1	c	3.0×10^8 m/s
Angular Momentum	1	$\hbar$	10^{34} m^2 kg/s
Energy	GeV	GeV	1.6×10^{-10} J
Momentum	GeV	GeV$/c$	1×10^{-19} kg m/s
Mass	GeV	GeV$/c^2$	1.8×10^{-27} kg
Time	1/GeV	$\hbar$/GeV	6.6^{-25} s
Length	1/GeV	$\hbar c$/GeV	2×10^{-16} m
Electric Charge	1	$e/\sqrt{4\pi\alpha_{\mathrm{em}}}$	5.3×10^{-19} C
Magnetic Field	$(\mathrm{GeV})^2$	$(\mathrm{GeV})^2/\hbar c^2$	5×10^{16} T

Good table design requires some thought and work, so it may be worth a look through some examples:

- TeX StackExchange: Tip on how to make a visually good table

- Edward Tufte endorsed example from Darkhorse Analytics

1.3. Dealing with Widows and Orphans

To reduce the difficulty of dealing with widowed text (the last line of a paragraph at the start of a page) and orphaned text (the first line of paragraph at the end of a page) the `nowidow` package is used. However, that doesn't solve the issue of orphaned section titles. The user must manually do this, but the following simple advice from TeX FAQ is recommended:

> Once you've exhausted the automatic measures, and have a final draft you want to "polish", you should proceed to manual measures. To get rid of an orphan is simple: precede the paragraph with `\clearpage` and the paragraph can't start in the wrong place.

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Chapter 2

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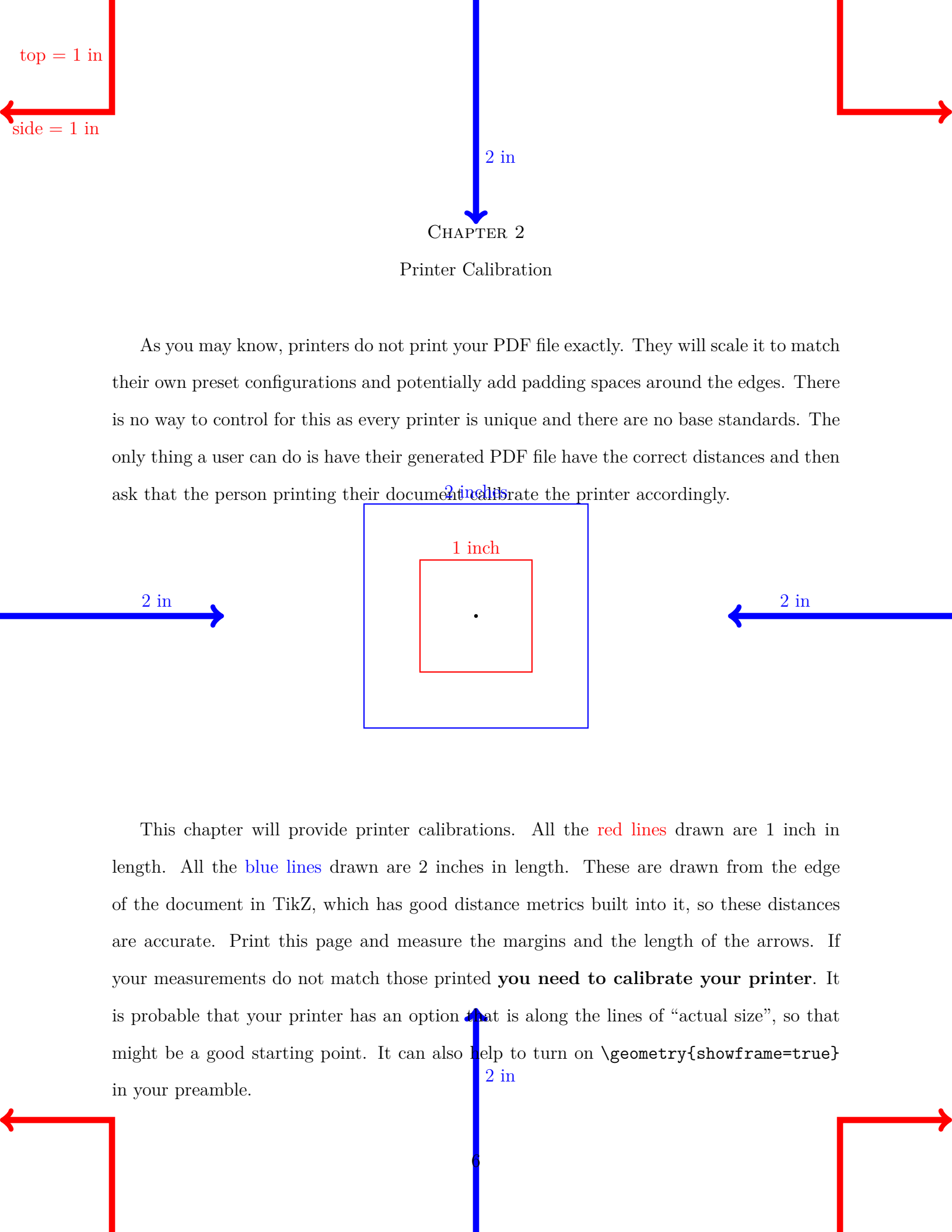
As you may know, printers do not print your PDF file exactly. They will scale it to match their own preset configurations and potentially add padding spaces around the edges. There is no way to control for this as every printer is unique and there are no base standards. The only thing a user can do is have their generated PDF file have the correct distances and then ask that the person printing their document calibrate the printer accordingly.

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This chapter will provide printer calibrations. All the red lines drawn are 1 inch in length. All the blue lines drawn are 2 inches in length. These are drawn from the edge of the document in TikZ, which has good distance metrics built into it, so these distances are accurate. Print this page and measure the margins and the length of the arrows. If your measurements do not match those printed **you need to calibrate your printer**. It is probable that your printer has an option that is along the lines of "actual size", so that might be a good starting point. It can also help to turn on `\geometry{showframe=true}` in your preamble.

2 in

APPENDIX A

An Appendix

Appendix text goes here.

GLOSSARY

Large Hadron Collider (LHC) Large Hadron Collider. viii, 1

thesis https://xkcd.com/1403/. 2

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