Progress Report

Project Aqueous

Number 6

School of Physics and Astronomy

University of Glasgow

April 2019

Abstract

A brief summary of the report.

Acknowledgements

The contributions of Number 2 and Number 1 are acknowledged.

Contents

List of Figures

List of Tables

Introduction

0.1 Higgs bosons

Higgs bosons are particles that arise through electroweak symmetry breaking. A principal motivation for the Large Hadron Collider physics programme was the testing of the theory of electroweak symmetry breaking, through the observation of Higgs bosons. In July of 2012, the existence of the Higgs boson was confirmed by the ATLAS and CMS experiments. Following this discovery, further studies have been ongoing in order to examine the character of the particle.

Chapter 1

A title for chapter 1

1.1 Section 1

This is content.

1.1.1 Time

A few time representations follow:

- 2019-04-18
- 18 April 2019
- April 2019
- 170635
- 1706
- 2019-04-18T170635
- 2019-04-18T1706

1.1.2 Units and units typesetting

- $a^{b}\,\mathrm{m}^{2}$ – correct unit typesetting (manual siunitx function) (preferred for mathematics mode, though note that the function for this is provided by aqueous [see below for manual equivalent method not dependent on aqueous])
- $10\,\mathrm{kg}$ – correct unit typesetting (siunitx)
- $10\,\mathrm{kg}$ – incorrect unit typesetting (mathematics, textnormal)
- 10 kg – incorrect unit typesetting (literally)
- $10\,\mathrm{kgms}^{-2}$ – correct unit typesetting (siunitx)
- $10^{-28}\,\mathrm{m}^{2}$ – correct unit typesetting, though very manual (siunitx)
- $a^{b}\,\mathrm{m}^{2}$ – correct unit typesetting, though manual (siunitx) (preferred for mathematics mode)
- $\mathrm{a}^{\mathrm{b}}\,\mathrm{m}^{2}$ – dodgy, manual correct unit typesetting (siunitx)
- $a^{b}\,\mathrm{m}^{2}$ (siunitx)
- The angle is 14°.
- The temperature is $14\,^{\circ}\mathrm{C}$. – correct unit typesetting (siunitx)

1.1.3 Mathematics

The following is a referenced equation:

$$E = mc^{2} \tag{1.1}$$

This is a reference to equation 1.1.

This is bold mathematics within non-bold mathematics: $t\bar{t}\boldsymbol{H}\left(b\bar{b}\right)$.

This is bold mathematics: $\boldsymbol{t\bar{t}H}\left(\boldsymbol{b\bar{b}}\right)$.

1.1.4 Lists

This is a list:

- function,
- Job,
- JobGroup,
- ParallelJobProcessor and
- pool.

This is a checklist:

- ✓ item
- ✓ item
  - ✓ subitem
  - ✓ subitem
    - ✓ subitem
- ✓ item
- ✗ item

1.1.5 Code

This is some code:

```
Reco_tf.py --inputBSFile data12.1234.RAW --outputESDFile data12.1234.ESD
```

1.1.6 Images

This is a figure set to a defined width:

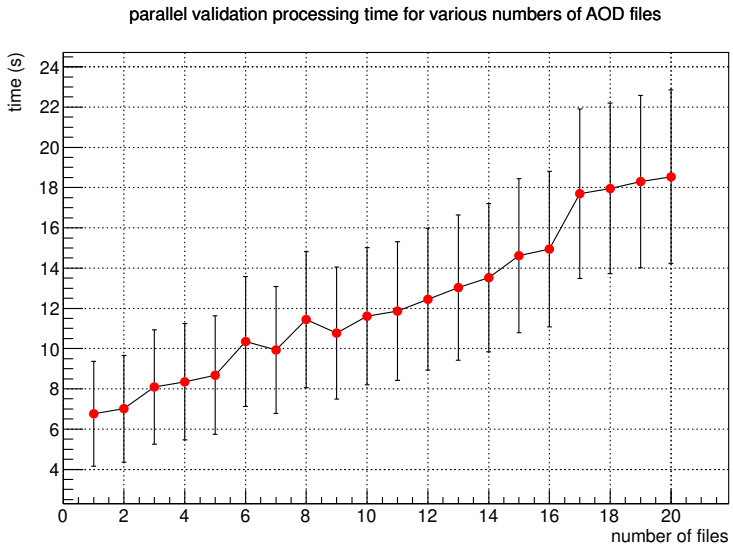

Figure 1.1: Parallel job processor: large efficiency improvement as a result of parallelisation

This is a figure set to the text width:

Figure 1.3: Feynman diagram

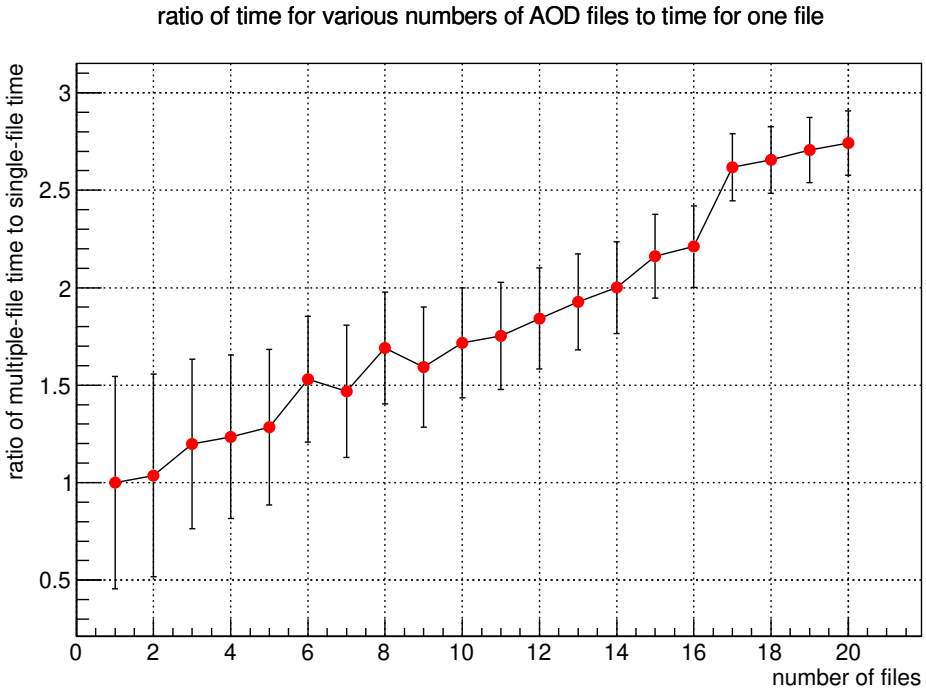

Figure 1.2: parallel job processor

Here is a Feynman diagram:

1.1.7 References

This is a reference to figure 1.2. This is a reference [1]. This is another reference [2]. This is a URL: https://github.com/wdbm/aqueous

1.1.8 ROOT

ROOT [3] is an object oriented data analysis framework aimed at solving data analysis challenges in high energy physics. While *ROOT* is simply a name, a possible acronym for the system could be *"Rapid Object-Oriented Technology"* [4]. ROOT was developed in the context of the NA49 experiment at CERN. NA49 generated data of approximately 10 TB per run. This rate of data provided a test environment for the development of ROOT, as the next generation of data analysis. ROOT features *Cling*, a C++ interpreter.[1]

[1] This is a footnote.

1.1.9 Some paragraphs

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea

dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

1.1.10 tables

input file option	description
`--inputHitsFile`	input only
`--inputBSFile`	RAW data (BS = ByteStream), currently input only
`--inputRDOFile`	
`--inputESDFile`	
`--inputAODFile`	

output file option	description
`--outputRDOFile valid`	if starting from Hits
`--outputESDFile valid`	if starting from Hits, RDO or BS
`--outputAODFile valid`	if starting from ESD or anything else upstream
`--outputNTUP_XXXFile`	can be made from ESD or AOD, BS or RDO

Figure 1.4: Reco_tf.py usage

Chapter 2

A title for future

If we can hit that bullseye, the rest of the dominos will fall like a house of cards. Checkmate!

Zapp Brannigan

You hear the bird's gurgling?

Pedro Carolino in *English As She is Spoke* (1883), a book which was intended as a Portuguese–English phrase book, but which was written by Carolino using dictionaries as opposed to a comprehension of the English language, hence it is a sort of 19^{th} century machine translation.

2.1 future plans and considerations

These are suggestions and plans for the future.

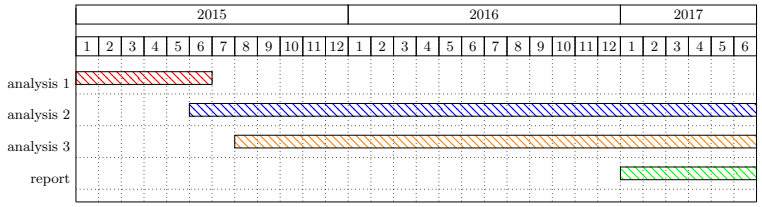

Figure 2.1: Gantt chart of work

References

[1] L. Li Tianjun, W. Xia, W. You-kai and Z. Shou-hua, *Distinguishing the Color Octet Axial-Vector-like Particle for Top Quark Asymmetry via Color Flow Method at the LHC* (June 2013), arXiv:1306.3586

[2] W. S. McCulloch and W. Pitts, *A logical calculus of the ideas immanent in nervous activity*, The Bulletin of Mathematical Biophysics, 5 (4), 115–133 (1943)

[3] *ROOT: A Data Analysis Framework* (November 2012), URL `http://root.cern.ch`

[4] R. Brun, *Re: What does ROOT stand for?*, RootTalk (May 1998), URL `http://root.cern.ch/root/roottalk/roottalk98/0718.html`