

# A title with some math: $x = 1$

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ABSTRACT: Abstract...

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## Contents

<b>1</b>	<b>Paper</b>	<b>1</b>
1.1	Introduction	1
1.2	PDF and $\alpha_s$ -independent representation of hadron induced cross sections	1
1.2.1	General expression of pQCD cross section	1
1.2.2	Concept: fastNLO interpolation	1
1.2.3	Factorize PDF dependence in cross sections	1
1.2.4	Factorize $\alpha_s$ -dependence in cross sections	1
1.2.5	Factorize scale dependence in cross sections	1
1.3	Technical implementation	2
1.4	Example applications	2
1.4.1	Jets in hadron-hadron collisions	2
1.4.2	DiffTop	2
1.4.3	Jets in NC DIS	2
1.5	fastNLO for diffractive processes	2
1.6	Outlook	2
1.7	Summary	2
<b>2</b>	<b>fastNLO manual v2.2</b>	<b>3</b>
2.1	Preamble	3
2.2	Requirements	3
2.3	Download and installation	3
2.4	fastNLO table format v2.2	3
2.5	fastNLO table format v2.3	3
2.6	Table creation: Interface fastNLO to NLO program	3
2.6.1	Requirements	3
2.6.2	Classes and class descriptions	3
2.6.3	Conceptional working principle	3
2.6.4	Interfacing fastNLO to new NLO program	3
2.6.5	Useful hints	3
2.6.6	Example implementation: nlojet++	3
2.7	The fastNLOCreate steering card	3
2.7.1	Generator specific keys	3
2.7.2	Process specific keys	3
2.7.3	Scenario specific keys	3
2.8	Table creation	3
2.8.1	Warmup run	3
2.8.2	Running order by order separately	3
2.9	Contribution flags	3
2.10	Merging tables	4

2.10.1	fastNLO programs	4
2.10.2	fastNLO c++ functionality	4
2.11	Modifying tables	4
2.11.1	fastNLO stand-alone programs	4
2.11.2	fastNLO function calls	4
2.12	Evaluation of a fastNLO table: Cross section calculation	4
2.12.1	Requirements	4
2.12.2	fastNLO stand-alone programs using LHAPDF	4
2.12.3	fastNLO c++ functionality	4
2.12.4	Predefined fastNLOReader interfaces	4
2.13	Implementing a new PDF interface	5
2.14	Implementing a new $\alpha_s$ evolution code	5
2.15	Python interface to fastNLOReader	5
2.16	Rivet and YODA interface to fastNLOReader	5
2.17	Independent Fortran reading code	5
<b>A</b>	<b>JHEP example</b>	<b>6</b>
A.1	And subsequent	7
A.1.1	Sub-sections	7

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## 1 Paper

### 1.1 Introduction

### 1.2 PDF and $\alpha_s$ -independent representation of hadron induced cross sections

#### 1.2.1 General expression of pQCD cross section

#### 1.2.2 Concept: fastNLO interpolation

#### 1.2.3 Factorize PDF dependence in cross sections

#### 1.2.4 Factorize $\alpha_s$ -dependence in cross sections

#### 1.2.5 Factorize scale dependence in cross sections

#### ‘Fixed-scale’ approach

Renormalization scale dependence

Factorization scale dependence

#### ‘Flexible-scale’ approach

### 1.3 Technical implementation

### 1.4 Example applications

#### 1.4.1 Jets in hadron-hadron collisions

#### 1.4.2 DiffTop

#### 1.4.3 Jets in NC DIS

### 1.5 fastNLO for diffractive processes

### 1.6 Outlook

### 1.7 Summary

## **2 fastNLO manual v2.2**

### **2.1 Preamble**

The term ‘NLO program’ denotes any kind of program in the following.

### **2.2 Requirements**

### **2.3 Download and installation**

### **2.4 fastNLO table format v2.2**

### **2.5 fastNLO table format v2.3**

todo

## **2.6 Table creation: Interface fastNLO to NLO program**

### **2.6.1 Requirements**

### **2.6.2 Classes and class descriptions**

### **2.6.3 Conceptional working principle**

### **2.6.4 Interfacing fastNLO to new NLO program**

### **2.6.5 Useful hints**

vector<table> ....

then merge or append

### **2.6.6 Example implementation: nlojet++**

nlojet++ interface

Creation of new scenario

Usage of pre-define scenarios

## **2.7 The fastNLOCreate steering card**

### **2.7.1 Generator specific keys**

### **2.7.2 Process specific keys**

### **2.7.3 Scenario specific keys**

## **2.8 Table creation**

### **2.8.1 Warmup run**

### **2.8.2 Running order by order separately**

## **2.9 Contribution flags**

additive

    multiplicative

    data

non-perturbative corrections  
fixed-order  
etc...

## **2.10 Merging tables**

### **2.10.1 fastNLO programs**

**fnlo-tk-merge**

**fnlo-tk-append**

### **2.10.2 fastNLO c++ functionality**

## **2.11 Modifying tables**

### **2.11.1 fastNLO stand-alone programs**

Not much available at the moment. Once we had the ‘fnlo-modifier’, but this is not ported to the toolkit. Maybe we have to provide some few functions for, e.g., removing data points, changing the binwidth, etc...

### **2.11.2 fastNLO function calls**

USE THEM WITH CARE !

## **2.12 Evaluation of a fastNLO table: Cross section calculation**

### **2.12.1 Requirements**

### **2.12.2 fastNLO stand-alone programs using LHAPDF**

**fnlo-tk-cppread**

**fnlo-tk-example**

**fnlo-tk-minexample**

### **2.12.3 fastNLO c++ functionality**

How to use fastNLOReader:

**Inheritance structure of fastNLOReader**

**fastNLOReader**

### **2.12.4 Predefined fastNLOReader interfaces**

**LHAPDF5 and LHAPDF6**

**QCDNUM**

**Hoppet**

- 2.13 Implementing a new PDF interface
- 2.14 Implementing a new  $\alpha_s$  evolution code
- 2.15 Python interface to fastNLOReader
- 2.16 Rivet and YODA interface to fastNLOReader
- 2.17 Independent Fortran reading code

**Figure 1.** Always give a caption.

x	y	x and y
a	b	a and b
1	2	1 and 2
$\alpha$	$\beta$	$\alpha$ and $\beta$

**Table 1.** We prefer to have borders around the tables.

## A JHEP example

For internal references use label-refs: see section [A](#). Bibliographic citations can be done with cite: refs. [\[1–3\]](#). When possible, align equations on the equal sign. The package `amsmath` is already loaded. See [\(A.1\)](#).

$$\begin{aligned}x &= 1, & y &= 2, \\z &= 3.\end{aligned}\tag{A.1}$$

Also, watch out for the punctuation at the end of the equations.

If you want some equations without the tag (number), please use the available starred-environments. For example:

$$x = 1$$

The `amsmath` package has many features. For example, you can use use `subequations` environment:

$$a = 1\tag{A.2a}$$

$$b = 2\tag{A.2b}$$

and it will continue to operate across the text also.

$$c = 3\tag{A.2c}$$

The references will work as you’d expect: [\(A.2a\)](#), [\(A.2b\)](#) and [\(A.2c\)](#) are all part of [\(A.2\)](#).

A similar solution is available for figures via the `subfigure` package (not loaded by default and not shown here). All figures and tables should be referenced in the text and should be placed at the top of the page where they are first cited or in subsequent pages. Positioning them in the source file after the paragraph where you first reference them usually yield good results. See [figure 1](#) and [table 1](#).

We discourage the use of inline figures (`wrapfigure`), as they may be difficult to position if the page layout changes.

We suggest not to abbreviate: “section”, “appendix”, “figure” and “table”, but “eq.” and “ref.” are welcome. Also, please do not use `\emph` or `\it` for latin abbreviations: i.e., et al., e.g., vs., etc.



## A.1 And subsequent

### A.1.1 Sub-sections

**Up to paragraphs.** We find that having more levels usually reduces the clarity of the article. Also, we strongly discourage the use of non-numbered sections (e.g. `\subsubsection*`). Please also see the use of “`\texorpdfstring{}{}`” to avoid warnings from the `hyperref` package when you have math in the section titles

## Acknowledgments

This is the most common positions for acknowledgments. A macro is available to maintain the same layout and spelling of the heading.

**Note added.** This is also a good position for notes added after the paper has been written.

## References

- [1] Author, *Title*, *J. Abbrev.* **vol** (year) pg.
- [2] Author, *Title*, arxiv:1234.5678.
- [3] Author, *Title*, Publisher (year).