

ATLAS Note

21st May 2019



Symbols defined in atlasphysics.sty

Ian C. Brock

University of Bonn

This note lists the symbols defined in atlasphysics.sty. These provide examples of how to define your own symbols, as well as many symbols that are often used in ATLAS documents.

This document was generated using version 07-03-00 of the ATLAS LATEX package. The TEX Live version is set to 2016. It uses the option atlasstyle, which implies that the standard ATLAS preprint style is used. The language is set to UKenglish.

Contents

1	atlasphysics.sty style file	2
2	atlasparticle.sty	5
3	atlashepparticle.sty	6
4	atlasjournal.sty	7
5	atlasmisc.sty	7
6	atlasxref.sty	9
7	atlasbsm.sty	10
8	atlasheavyion.sty	11
9	atlasjetetmiss.sty	12
10	atlasmath.sty	15
11	atlasother.sty	16
12	atlasprocess.sty	16
13	atlashepprocess.sty	17
14	atlassnippets.sty	18
15	atlasunit.sty	19
16	Changes	20
17	Old macros	20

1 atlasphysics.sty style file

The atlasphysics.sty style file implements a series of useful shortcuts to typeset a physics paper, such as particle symbols.

Options are parsed with the **kvoptions** package, which is included by default. The style file can included in the preamble of your paper with the usual syntax:

\usepackage{\ATLASLATEXPATH atlasphysics}

As of version 01-00-00 the file is actually split into smaller files, which can be included or not using options. The following options are available, where the default setting is given in parentheses:

BSM (false) BSM and SUSY particles.

hion (false) Useful macros for heavy ion physics.

jetetmiss (false) Useful macros for Jet/Etmiss publications.

journal (true) Journal abbreviations and a few other definitions for references.

math (false) A few extra maths definitions.

misc (true) Miscellaneous definitions that are often used.

other (false) Definitions that used to be in atlasphysics.sty, but are probably too specialised to be needed by most people.

particle (true) Standard Model particles and some combinations.

hepparticle (false) Standard Model particles and some combinations using the hepparticle package. This option will supersede particle at some time.

process (false) Some example processes. These are not included by default as the current choice is rather arbitrary and certainly not complete.

hepprocess (false) Some example processes using the hepparticle package. These are not included by default as the current choice is rather arbitrary and certainly not complete. This option will supersede process at some time.

unit (true) Units that used to be defined – not needed if you use siunitx or hepunits.

xref (true) Useful abbreviations for cross-references.

texlive=YYYY (2016) Set if you use an older version of T_FX Live like 2009.

texmf Use the syntax \usepackage{package} instead of \usepackage{\ATLASLATEXPATH package} to include packages. This is needed if you install atlaslatex centrally, rather than in a latex subdirectory.

Note that BSM and BSM=true are equivalent. Use the syntax option=false to turn off an option.

If the option texmf is included, the subfiles are included using the command: \RequirePackage{atlasparticle} etc. instead of \RequirePackage{\ATLASLATEXPATH atlasparticle}. This is useful if you install the ATLAS LATEX package in a central directory such as \${HOME}/texmf/tex/latex.

All definitions are done in a consistent way using \newcommand*. All definitions use \ensuremath where appropriate and are terminated with \xspace, so you can simply write \ttbar production instead of \ttbar\ production or \ttbar{} production to get ' $t\bar{t}$ production'.

The hepparticles [1] package has uniform definitions for many Standard Model and BSM particles. In fact you should use the package heppennames and/or heppicenames, which contain many predefined particles. These packages load hepparticles, which can then be used to define more particles if you need them. One very nice feature of these packages is that you can switch between italic and upright symbols via an option.

See Section 17 for details on changes that were introduced when when going from version 00-04-05 of atlasnote to version 01-00-00 of atlaslatex. Let me know if you spot some other changes that are not documented here!

Changes to the contents that might affect existing documents are given in Section 16.

The following sections list the macros defined in the various files.

2 atlasparticle.sty

Turn on including these definitions with the option particle=true and off with the option particle=false.

As an alternative you can use the hepparticles [1] package, which has uniform definitions for many Standard Model and BSM particles.

Use the hepparticle=true instead of particle=true to use the hepparticle definitions.

\pp	pp
\pbar	\bar{p}
\ppbar	$par{p}$
\tbar	\bar{t}
\ttbar	$tar{t}$
\bbar	$ar{b}$
\bbbar	$bar{b}$
\cbar	\bar{c}
\ccbar	$c\bar{c}$
\sbar	\bar{s}
\ssbar	$s\bar{s}$
\ubar	\bar{u}
\uubar	иū
\dbar	$ar{d}$
\ddbar	$dar{d}$
\fbar	$ar{f}$
\ffbar	$far{f}$
\qbar	$ar{q}$
\qqbar	$qar{q}$
\nbar	$ar{ u}$
\nnbar	$ u \bar{ u}$
\ee	e^+e^-
\epm	e^{\pm}
\epem	e^+e^-
\mumu	$\mu^+\mu^-$
\tautau	$ au^+ au^-$
\leplep	$\ell^+\ell^-$
\ellell	$\ell^+\ell^-$

ev
$\mu\nu$
$\ell \nu$
$ au_{ m lep}$
$ au_{ m had}$
$ au_{ ext{had-vi}}$
Z
Z
W^+
W^-
W
W^\pm
W^{\mp}
π^0
π^+
π^-
π^\pm
π^{\mp}
η'
K^0
\overline{K}^0
K
K^+
K^{-}
$K_{\underline{L}}^{0}$
$K_{\rm L}^{\overline{0}}$
$K_{\rm I}^0$
$K_{\rm S}^0$
$K_{\rm S}^{0}$
$K_{\rm S}^0$
K^*
J/ψ
J/ψ
$\psi(2S)$
χ_c
$\Upsilon(1S)$
χ_b
D^*

\Bd	B_d^0
\Bs	B_s^0
\Bu	B_u
\Bc	B_c
\Lb	Λ_b
\Bstar	B^*
∖ВоВо	B^0 – \bar{B}^0
\BodBod	$B_{d}^{0} - \bar{B}_{d}^{0}$
\BosBos	$B_{s}^{0} - \bar{B}_{s}^{0}$

Generic macros τ_1 and τ_1 are available. They are defined such that τ_3 produces τ_3 -prong and τ_3 produces τ_3 -produces τ_3 -

3 atlashepparticle.sty

Turn on including these definitions with the option hepparticle=true and off with the option hepparticle=false.

These definitions use the hepparticles [1] package, which has uniform definitions for many Standard Model and BSM particles. The names used are those in heppennames. The package loads hepparticles, which can then be used to define more particles if you need them. One very nice feature of these packages is that you can switch between italic and upright symbols via an option.

This version of the document uses the particle and process options and so does not show the definitions made using the hepparticle and hepprocess options.

Generic macros $\t = 1$ and $\t = 1$ are available. They are defined such that $\t = 1$ produces \t

4 atlasjournal.sty

5 atlasmisc.sty

Turn on including these definitions with the option journal=true and off with the option journal=false.

Turn on including these definitions with the option misc=true and off with the option misc=false.

\AcPA	Acta Phys. Austriaca	\pT	p_{T}
\ARevNS	Ann. Rev. Nucl. Sci.	\pt	p_{T}
\CPC	Comp. Phys. Comm.	\ET	$E_{ m T}$
\EPJ	Eur. Phys. J.	\eT	$E_{ m T}$
\EPJC	Eur. Phys. J. C	\et	$E_{ m T}$
\FortP	Fortschr. Phys.	\HT	H_{T}
\IJMP	Int. J. Mod. Phys.	\pTsq	$p_{ m T}^2$
\JETP	Sov. Phys. JETP	\MET	$E_{ m T}^{ m miss}$
\JETPL	JETP Lett.	\met	$E_{ m T}^{ m miss}$
\JaFi	Jad. Fiz.	\sumET	$\sum E_{\mathrm{T}}$
\JMP	J. Math. Phys.	\EjetRec	$E_{\rm rec}$
\MPL	Mod. Phys. Lett.	\PjetRec	$p_{\rm rec}$
\NCim	Nuovo Cimento	\EjetTru	$E_{\rm true}$
\NIM	Nucl. Instrum. Meth.	\PjetTru	$p_{\rm true}$
\NIMA	Nucl. Instrum. Meth. A	\EjetDM	E_{DM}
\NP	Nucl. Phys.	\Rcone	$R_{\rm cone}$
\NPB	Nucl. Phys. B	\abseta	$ \eta $
\PL	Phys. Lett.	\Ecm	$E_{\rm cm}$
\PLB	Phys. Lett. B	\rts	\sqrt{s}
\PR	Phys. Rev.	\sqs	\sqrt{s}
\PRC	Phys. Rev. C	\Nevt	$N_{\rm evt}$
\PRD	Phys. Rev. D	\zvtx	$z_{ m vtx}$
\PRL	Phys. Rev. Lett.	\dzero	d_0
\PRep	Phys. Rep.	\zzsth	$z_0 \sin(\theta)$
\RMP	Rev. Mod. Phys.	\Run0ne	Run 1
\Z f P	Z. Phys.	\RunTwo	Run 2
\collab	Collaboration	\RunThr	Run 3
		\kt	k_t
		\antikt	anti- k_t
		\Antikt	Anti- k_t
		\pileup	pile-up
		\Pileup	Pile-up

\btag

b-tagging

\btagged	b-tagged	\muR
\bquark	<i>b</i> -quark	\ra
\bquarks	<i>b</i> -quarks	\la
\bjet	<i>b</i> -jet	\rarr
\bjets	<i>b</i> -jets	\larr
\mh	m_h	\lapp
\mbox{mW}	m_W	\rapp
\mbox{mZ}	m_Z	\gam
\mbox{mH}	m_H	\stat
\ACERMC	AcerMC	\syst
\ALPGEN	Alpgen	\radl
\GEANT	GEANT	\StoE
\Herwigpp	Herwig++	\alph
\HERWIGpp	Herwig++	\NF
\Herwig	Herwig	\NC
\HERWIG	Herwig	\CF
\JIMMY	Jіммү	\CA
\MADSPIN	MadSpin	\TF
\MADGRAPH	MadGraph	\Lms
\MGMCatNLO	MadGraph5_aMC@NLO	\Lmsf
\MCatNLO	MC@NLO	\kper
\AMCatNLO	aMC@NLO	\Vcb
\MCFM	MCFM	\Vub
\METOP	МЕтор	\Vtd
\POWHEG	Роwнес	\Vts
\POWHEGBOX	Powheg-Box	\Vtb
\POWPYTHIA	Powheg+Pythia	\Vcs
\PROTOS	Protos	\Vud
\PYTHIA	Рутніа	\Vus
\SHERPA	Sherpa	\Vcd
\Comphep	CompHEP	
\Perugia	Perugia	A lengt
\Prospino	Prospino	than \t
\L0	LO	Most N
\NLO	NLO	with a
\NLL	NLL	version
		, 0151011

\NNLO

 \mbox{muF}

NNLO

 $\mu_{ extsf{F}}$

 μ_{R} arrow arrow ≲ approx \gtrsim approx am γ tat (stat.) yst (syst.) adlength X_0 toB S/Blphas α_{S} $N_{\rm F}$ $N_{\rm C}$ C_{F} $C_{\rm A}$ T_{F} $\Lambda_{\overline{MS} \atop \Lambda^{(5)}_{\overline{MS}}}$ ทร nsfive k_{\perp} perp cb $|V_{cb}|$ $|V_{ub}|$ ub td $|V_{td}|$ $|V_{ts}|$ S tb $|V_{tb}|$ $|V_{cs}|$ cs $|V_{ud}|$ ud us $|V_{us}|$ cd $|V_{cd}|$

A length \figwidth is defined that is 2 cm smaller than \textwidth.

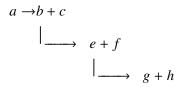
Most Monte Carlo generators also have a form with a suffix 'V' that allows you to include the version, e.g. \PYTHIAV{8} to produce PYTHIA 8 or \PYTHIAV{8 (v8.160)} to produce PYTHIA 8 (v8.160).

A generic macro \twomass is defined, so that for example \twomass{\mu} {\mu} produces $m_{\mu\mu}$ and \twomass{\mu}{e} produces $m_{\mu e}$.

A macro \dk is also defined which makes it easier to write down decay chains. For example

 $\[\arrowvert = \arrowvert =$

produces



Note that \eqalign is also redefined in this package so that \dk works.

The following macro names have been changed: $\protect\protec$

6 atlasxref.sty

Turn on including these definitions with the option xref=true and off with the option xref=false.

The following macros with arguments are also defined:

The following macros wi	ui aiguillellis ale aiso u
$\Lambda pp{1}$	Appendix 1
$\P1$	Eq. 1
$Fig{1}$	Figure 1
$\Ref{1}$	Ref. 1
\Sect{1}	Section 1
$Tab{1}$	Table 1
$\Lambda pps{1}{4}$	Appendices 1 and 4
$\P\{1\}\{4\}$	Eqs. 1 and 4
$Figs{1}{4}$	Figures 1 and 4
$\Refs{1}{4}$	Refs. 1 and 4
\Sects{1}{4}	Sections 1 and 4
$Tabs{1}{4}$	Tables 1 and 4
$\Lambda pprange{1}{4}$	Appendices 1–4
$\Eqnrange{1}{4}$	Eqs. 1–4
$Figrange{1}{4}$	Figures 1–4
$\Refrange{1}{4}$	Refs. 1–4
$\Sectrange{1}{4}$	Sections 1–4
$\texttt{Tabrange}\{1\}\{4\}$	Tables 1–4

The idea is that you can adapt these definitions according to your own preferences (or those of a journal).

7 atlasbsm.sty

Turn on including these definitions with the option BSM and off with the option BSM=false.

The macro \susy simply puts a tilde ($\tilde{}$) over its argument, e.g. \susy{q} produces \tilde{q} .

For \tilde{q} , \tilde{t} , \tilde{b} , $\tilde{\ell}$, \tilde{e} , $\tilde{\mu}$ and $\tilde{\tau}$, L and R states are defined; for stop, sbottom and stau also the light (1) and heavy (2) states. There are four neutralinos and two charginos defined, the index number unfortunately needs to be written out completely. For the charginos the last letter(s) indicate(s) the charge: 'p' for +, 'm' for -, and 'pm' for \pm .

_	
\Azero	A^0
\hzero	h^0
\Hzero	H^0
\Hboson	H
\Hplus	H^+
\Hminus	H^{-}
\Hpm	H^\pm
\Hmp	H^{\mp}
\ggino	$ ilde{\mathcal{X}}$
\chinop	${ ilde {\cal X}}^+$
\chinom	$ ilde{\mathcal{X}}^-$
\chinopm	$ ilde{\mathcal{X}}^{\pm}$
\chinomp	${ ilde {\mathcal X}}^{\mp}$
\chinoonep	$\tilde{\mathcal{X}}_1^+$
\chinoonem	$\tilde{\chi}_1^-$
\chinoonepm	$ ilde{\mathcal{X}}_1^\pm$
\chinotwop	$ ilde{\mathcal{X}}_2^+$
\chinotwom	$\tilde{\chi}_2^-$
\chinotwopm	$ ilde{\mathcal{X}}_2^\pm$
\nino	$\tilde{\chi}^{0}$
\ninoone	$ ilde{\mathcal{X}}_1^0$
\ninotwo	$ ilde{\chi}_2^0$
\ninothree	$\tilde{\chi}_3^0$
\ninofour	$ ilde{\chi}_{4}^{0}$
\gravino	$ ilde{G}$

\Zprime	Z'
\Zstar	Z^*
\squark	$ ilde{q}$
\squarkL	$ ilde{q}_{ m L}$
\squarkR	$ ilde{q}_{ m R}$
\gluino	
\stop	$rac{ ilde{g}}{ ilde{t}}$
\stopone	\tilde{t}_1
\stoptwo	\tilde{t}_2
\stopL	$ ilde{t}_{ m L}$
\stopR	$ ilde{t}_{ m R}$
\sbottom	$ ilde{b}$
\sbottomone	$ ilde{b}_1$
\sbottomtwo	$ ilde{b}_2$
\sbottomL	$ ilde{b}_{ m L}$
\sbottomR	$ ilde{b}_{ m R}$
\slepton	$ ilde{\ell}$
\sleptonL	$ ilde{\ell}_{ m L}$
\sleptonR	$\tilde{\ell}_R$
\sel	$ ilde{e}$
\selL	$ ilde{e}_{ m L}$
\selR	$ ilde{e}_{ m R}$
\smu	$ ilde{\mu}$
\smuL	$ ilde{\mu}_{ m L}$
\smuR	$ ilde{\mu}_{ m R}$
\stau	$ ilde{ au}$
\stauL	$ ilde{ au}_{ m L}$
\stauR	$ ilde{ au}_{ m R}$
\stauone	$ ilde{ au}_1$
\stautwo	$ ilde{ au}_2$
\snu	$\tilde{\nu}$
\snu	ν

${\bf 8}$ atlasheavyion.sty

Turn on including these definitions with the option hion=true and off with the option hion=false. The heavy ion definitions use the package mhchem to help with the formatting of chemical elements. This package is included by atlasheavyion.sty.

\NucNuc	A+A
\nn	nn
\pn	pn
\np	np
\PbPb	Pb+Pb
\AuAu	Au+Au
\CuCu	Cu+Cu
\pNuc	p+A
\pdA	p/d+A
\dAu	d+Au
\pPb	p+Pb
\Npart	$N_{ m part}$
\avgNpart	$\langle N_{ m part} angle$
\Ncoll	$N_{ m coll}$
\avgNcoll	$\langle N_{ m coll} angle$
\TA	$T_{ m A}$
\avgTA	$\langle T_{ m A} angle$
\TPb	T_{Pb}
\avgTPb	$\langle T_{ m Pb} angle$
\TAA	T_{AA}
\avgTAA	$\langle T_{ m AA} angle$
\TAB	$T_{ m AB}$
\avgTAB	$\langle T_{ m AB} angle$
\TpPb	$T_{p\text{Pb}}$
\avgTpPb	$\langle T_{p ext{Pb}} angle$
\G1	Glauber
\GG	Glauber-Gribov
\sqn	$\sqrt{s_{_{ m NN}}}$
\lns	$\ln(\sqrt{s})$
\sumETPb	$\Sigma E_{ m T}^{ m Pb}$
\sumETp	$\Sigma E_{ m T}^{ extit{p}}$

\sumETA	$\Sigma E_{ m T}^{ m A}$
\RAA	R_{AA}
\RCP	R_{CP}
\RpA	R_{pA}
\RpPb	$R_{p ext{Pb}}$
\dNchdeta	$\mathrm{d}N_\mathrm{ch}/\mathrm{d}\eta$
\dNevtdET	$dN_{\rm evt}/dE_{\rm T}$
\ystar	<i>y</i> *
\ycms	УСМ
\ygappb	$\Delta\eta_{ m gap}^{ m Pb}$
\ygapp	$\Delta\eta_{ m gap}^{ar{p}^{-}}$
\fgap	$f_{ m gap}$

9 atlasjetetmiss.sty

Turn on including these definitions with the option jetetmiss=true and off with the option jetetmiss=false.

\topo	topo-cluster
\Topo	Topo-cluster
\topos	topo-clusters
\Topos	Topo-clusters
\insitu	in situ
\Insitu	In situ
\LS	LS
\NLOjet	NLOJet++
\Fastjet	FastJet
\TwoToTwo	$2 \rightarrow 2$
\largeR	large-R
\LargeR	Large-R
\akt	anti- k_t
\Akt	Anti- k_t
\AKT	anti- k_t
\AKTFat	anti- k_t , $R = 1.0$
\AKTPrune	anti- k_t , $R = 1.0$ (pruned)
\AKTFilt	anti- k_t , $R = 1.0$ (filtered)
\KTSix	$k_t, R = 0.6$
\ca	Cambridge-Aachen
\CamKt	C/A
\CASix	C/A, R = 0.6
\CAFat	C/A, R = 1.2
\CAPrune	C/A, $R = 1.2$ (pruned)
\CAFilt	C/A, $R = 1.2$ (filtered)
\htt	HEPTopTagger
\mcut	m_{cut}
\Nfilt	$N_{ m filt}$
\Rfilt	$R_{ m filt}$
\ymin	\mathcal{Y}_{\min}
\fcut	$f_{ m cut}$
\Rsub	$R_{ m sub}$

```
\mufrac
                     \mu_{\mathrm{frac}}
\Rcut
                     R_{\rm cut}
\zcut
                     z_{\rm cut}
\ftile
                     f_{\text{Tile}0}
\fem
                     f_{LAr3}
\fpres
                     f_{PS}
\fhec
                     f_{\rm HEC0}
\ffcal
                     f_{\text{FCal}1}
\central
                    0.3 \le |\eta| < 0.8
\ecap
                     2.1 \le |\eta| < 2.8
\forward
                    3.6 \le |\eta| < 4.5
\Npv
                     N_{\rm PV}
\Nref
\Navg
                     \langle N_{\rm PV} \rangle
\avgmu
                     \langle \mu \rangle
\JES
                     JES
\JMS
                     JMS
\EMJES
                     EM+JES
\GCWJES
                     GCW+JES
                     LCW+JES
\LCWJES
\backslash EM
                     EM
\GCW
                     GCW
\LCW
                     LCW
\GSL
                     GSL
                     GS
\GS
\MTF
                     MTF
                     MPF
\MPF
\Njet
                     N_{\rm jet}
                     N_{\rm jet}
\njet
                    E_{\mathrm{T}}^{\mathrm{jet}}
E_{\mathrm{T}}^{\mathrm{jet}}
p_{\mathrm{T}}^{\mathrm{avg}}
p_{\mathrm{T}}^{\mathrm{avg}}
p_{\mathrm{fet}}^{\mathrm{jet}}
p_{\mathrm{T}}^{\mathrm{jet}}
p_{\mathrm{T}}^{\mathrm{jet}}
\ETjet
\etjet
\pTavg
\ptavg
\pTjet
\ptjet
\pTcorr
\ptcorr
\pTjeti
```

\ptjeti	$p_{\mathrm{T},i}^{\mathrm{jet}}$	\Rcalo	$\mathcal{R}^{ ext{jet}}$
\pTrecoil	p_{τ}^{recoil}	\Rcalom	$\mathcal{R}_m^{ ext{jet}}$
\ptrecoil	$p_{ m T}^{ m recoil}$	\RcaloEM	$\mathcal{R}_{ ext{EM}}^{ ext{jet}}$
\pTleading	$p_{ m T}^{ m feading}$	\RMPF	\mathcal{R}_{MPF}
\ptleading	$p_{ m T}^{ m feading}$	\EcaloCALIB	$E^{ m jet}$
\pTjetEM	pet P _{T, EM}	\RcaloCALIB	$\mathcal{R}^{ ext{jet}}$
\ptjetEM	pet p _{T, EM}	\EcaloEMJES	$E_{ ext{EM+JES}}^{ ext{jet}} \ \mathcal{R}_{ ext{EM+JES}}^{ ext{jet}} \ E_{ ext{GCW+JES}}^{ ext{jet}}$
\pThat	$\hat{p}_{ m T}$, em $\hat{p}_{ m T}$	\RcaloEMJES	$\mathcal{R}_{ ext{EM+IES}}^{ ext{jet}}$
\pthat	$\hat{p}_{ ext{T}}$	\EcaloGCWJES	$E_{\text{GCW+JES}}^{\text{jet}}$
\pTprobe	$p_{\mathrm{T}}^{\mathrm{probe}}$	\RcaloGCWJES	$\mathcal{R}_{\mathrm{GCW+IES}}^{\mathrm{jet}}$
\ptprobe	$p_{\mathrm{T}}^{\mathrm{probe}}$	\EcaloLCWJES	$E_{ m LCW+JES}^{ m jet}$
\ptprobe \pTref	$p_{ m T}^{ m ref}$	\RcaloLCWJES	Rich + JES
\ptref	$p_{ m T}^{ m ref}$	\Rtrack	R ^{track jet}
\pToff	<i>P</i> _T <i>O</i>	\rtrk	$r_{ m trk}$
\ptoff	0	\Rtrk	$R_{ m trk}$
\pToffjet	O^{jet}	\rtrackjet	rcalo / track jet
\ptoffjet	$O^{ m jet}$	\rtrackjetiso	calo / track jet riso calo / track jet
\pTZ	•	\rtrackjetnoniso	calo / track jet r _{non-iso} calo / track jet
\ptZ	$egin{array}{l} p_{ m T}^Z \ p_{ m T}^Z \end{array}$	\rtrackjetisoratio	calo / track jet
\pTtrue	$p_{ m T}^{ m true}$	\gammajet	non-iso/iso γ+jet
\pttrue	$p_{ m T}^{ m true}$	\deltaphijetgamma	$\Delta\phi_{ m jet-\gamma}$
\pTtruth	$p_{ m T}^{ m true}$	\rapjet	y
\pttruth	$p_{ m T}^{ m true}$	\etajet	η
\pTreco	$p_{\mathrm{T}}^{\mathrm{reco}}$	\phijet	ϕ
\ptreco	$p_{ m T}^{ m reco}$	\etadet	$n_{ m dat}$
\pTtrk	$p_{ m T}^{ m track}$	\etatrk	$\eta^{ m track}$
\pttrk	$p_{\mathrm{T}}^{\mathrm{track}}$	\Rmin	R_{\min}
\ptrk	p ^{track}	\DeltaR	ΔR
\pTtrkjet	$p_{\mathrm{T}}^{\mathrm{track}}$ jet	\DetaDphi	$\sqrt{(\Delta \eta)^2 + (\Delta \phi)^2}$
\pttrkjet	$p_{ m T}^{ m track}$ jet	\Deta	$ \Delta\eta $
\ntrk	n_{track}	\Drap	$ \Delta y $
\EoverP	E/p	\DetaOneTwo	$ \Delta \eta(\text{jet1, jet2}) $
\Etrue	$E^{ m true}$	\DyDphi	$\sqrt{(\Delta y)^2 + (\Delta \phi)^2}$
\Etruth	$E^{ m true}$	\DeltaRdef	$\Delta R = \sqrt{(\Delta \eta)^2 + (\Delta \phi)^2}$
\Ecalo	$E^{ m jet}$	\DeltaRydef	$\Delta R = \sqrt{(\Delta y)^2 + (\Delta \phi)^2}$
\EcaloEM	$E_{ m EM}^{ m jet}$	\DeltaRtrk	$\Delta R(\text{trk}_1, \text{trk}_2)$
\asym	$\mathcal{A}^{^{\mathrm{LW}}}$	\JVF	JVF
\Response	$\mathcal R$	\cJVF	corrJVF
		, -	

```
wcalo
\RpT
                                                                                                \wcalo
                                   R_{p_{\mathrm{T}}}
                                   JVT
                                                                                                                               wtrack
\JVT
                                                                                                \wtrk
                                                                                                                               V
                                                                                                \shapeV
\ghostpt
                                   g_t
                                                                                                                              p_{\mathrm{T}}^{\mathrm{subjet}}
p_{\mathrm{T}}^{\mathrm{subjet}}
\ghostptavg
                                   \langle g_t \rangle
                                                                                                \pTsubjet
\ghostfm
                                   g_{\mu}
                                                                                                \ptsubjet
\ghostfmi
                                   g_{\mu,i}
                                                                                                \sjone
                                                                                                                              j_1
\ghostdensity
                                   \nu_g
                                                                                                \sjtwo
                                                                                                                              j_2
\ghostrho
                                   v_g\langle g_t\rangle
                                                                                                                              m^{j_1}
                                                                                                \msubjone
\Aghost
                                   A_g
                                                                                                                              m^{j_2}
                                                                                                \msubjtwo
\Amu
                                   A_{\mu}
                                                                                                \pTsubji
\Amui
                                   A_{\mu,i}
                                                                                                \ptsubji
                                   A^{\rm jet}
\jetarea
                                                                                                \pTsubjone
                                   A_{\mu}^{
m jet}
A_{i}^{
m jet}
\jetareafm
                                                                                                \ptsubjone
\jetareai
                                                                                                \pTsubjtwo
                                   R_{k_t}
\Rkt
                                                                                                \ptsubjtwo
\pTmuslope
                                   \partial \langle \Delta p_{\rm T} \rangle / \partial \langle \mu \rangle
                                                                                                \Rsubjets
                                                                                                                               R_{j_1,j_2}
\ptmuslope
                                   \partial \langle \Delta p_{\rm T} \rangle / \partial \langle \mu \rangle
                                                                                                                              \Delta R_{j_1,j_2}
                                                                                                \DRsubjets
\pTnpvslope
                                   \partial \langle \Delta p_{\rm T} \rangle / \partial N_{\rm PV}
                                                                                                \yij
                                                                                                                               y_{ij}
                                   \partial \langle \Delta p_{\rm T} \rangle / \partial N_{\rm PV}
\ptnpvslope
                                                                                                \dcut
                                                                                                                               d_{\mathrm{cut}}
\pTmuunc
                                   \Delta \left( \partial \langle \Delta p_{\rm T} \rangle / \partial \langle \mu \rangle \right)
                                                                                                \dmin
                                                                                                                               d_{\min}
\ptmuunc
                                   \Delta \left( \partial \langle \Delta p_{\rm T} \rangle / \partial \langle \mu \rangle \right)
                                                                                                \dij
                                                                                                                               d_{ij}
\pTnpvunc
                                   \Delta \left( \partial \langle \Delta p_{\rm T} \rangle / \partial N_{\rm PV} \right)
                                                                                                                               \sqrt{d_{ij}}
                                                                                                \Dij
\ptnpvunc
                                   \Delta \left( \partial \langle \Delta p_{\rm T} \rangle / \partial N_{\rm PV} \right)
                                                                                                                               \sqrt{d_{12}}
                                                                                                \Donetwo
\sumPt
                                   \sum \vec{p}_{\mathrm{T}}
                                                                                                \Dtwothr
                                                                                                                               \sqrt{d_{23}}
\sumpt
                                   \sum \vec{p}_{\mathrm{T}}
                                                                                                \yonetwo
                                                                                                                               y_1
                                   \sum p_{\mathrm{T}}^{\mathrm{track}}
\sum p_{\mathrm{T}}^{\mathrm{track}}
\sumpTtrk
                                                                                                \ytwothr
                                                                                                                               У2
\sumpttrk
                                                                                                                               y_1 = \sqrt{d_{12}}/m^{\text{jet}}
                                                                                                \yonetwoDef
                                   n_{\mathrm{trk}}^{\mathrm{PU}}
m^{\mathrm{jet}}
\nPUtrk
                                                                                                                               y_2 = \sqrt{d_{23}}/m^{\text{jet}}
                                                                                                \ytwothrDef
\mjet
                                                                                                \xj
                                   m_1^{\text{jet}} \langle m_1^{\text{jet}} \rangle
\mlead
                                                                                                                               J^{(eik),c}(m^{\text{jet}},p_{\text{T}},R)
                                                                                                \jetFunc
\mleadavg
                                                                                                \tauone
                                                                                                                               	au_1
                                   m^{\rm jet}
\Mjet
                                                                                                \tautwo
                                                                                                                               	au_2
                                   m^{\rm jet}
\massjet
                                                                                                \tauthr
                                                                                                                               	au_3
                                   mcorr
\masscorr
                                                                                                \tauN
                                                                                                                               \tau_N
                                   M_{\rm threshold}
\mthresh
                                                                                                \tautwoone
                                                                                                                               	au_{21}
                                   \langle m^{\rm jet} \rangle
\mjetavg
                                                                                                \tauthrtwo
                                                                                                                               	au_{32}
                                   mtrack jet
\masstrkjet
                                                                                                \dip
                                                                                                                               \mathcal D
\width
                                   w
                                                                                                \diponetwo
                                                                                                                               \mathcal{D}_{12}
```

\diptwothr	\mathcal{D}_{23}
\diponethr	\mathcal{D}_{13}
\mtaSup	m^{TA}
\mcalo	$m^{\rm calo}$
\mcomb	m^{comb}
\ECF0ne	ECF_1
\ECFTwo	ECF_2
\ECFThr	ECF_3
\ECFThrNorm	e_3
\DTwo	D_2
\CTwo	C_2
\FoxWolfRatio	$R_2^{\overline{\mathrm{FW}}}$
\PlanarFlow	$\mathcal{P}^{}$
\Angularity	a_3
\Aplanarity	\boldsymbol{A}
\KtDR	KtDR
\Qw	Q_w
\NConst	N^{const}

10 atlasmath.sty

Turn on including these definitions with the option math=true and off with the option math=false.

\boxsq
$$\Box^2$$
 \grad ∇

The macro \spinor is also defined. $\spinor\{u\}$

produces
$$\begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \end{pmatrix}$$

The macro \etaRange produces what you would expect: \etaRange{-2.5}{+2.5} produces $-2.5 \le |\eta| < +2.5$ while \AetaRange{1.0} produces $|\eta| < 1.0$. The macro \avg can be used for average values: \avg{\mu} produces $\langle \mu \rangle$.

11 atlasother.sty

Turn on including these definitions with the option other and off with the option other=false.

```
\etpt
                        1/p_{\rm T} - 1/E_{\rm T}
                        (1/p_{\rm T} - 1/E_{\rm T})/(\sigma(1/p_{\rm T}))
\etptsig
                        10^{31}\,cm^{-2}\,s^{-1}
\begL
                        10^{33}\,\mathrm{cm^{-2}\,s^{-1}}
\lowL
                        10^{34}\,cm^{-2}\,s^{-1}
\highL
\Epsb
                        \epsilon_b
\Epsc
                        \epsilon_c
\Mtau
                        m_{\tau}
                        \sin^2 \theta_{\rm W}
\swsq
                       \sin^2 \theta_{\text{eff}}^{\text{lept}}
\swel
                        \sin^2 \overline{\theta}_{W}
\swsqb
                        \sin^2 \theta_{\rm W} \equiv 1 - m_{\rm W}^2 / m_{\rm Z}^2
\swsqon
\gv
                        g_{V}
\ga
                        g_{A}
\gvbar
                        \bar{g}_{V}
\gabar
                        \bar{g}_{\mathrm{A}}
                        Z^*
\Zzv
                        A_{b\bar{b}}
\Abb
\Acc
                        A_{c\bar{c}}
                        A_{q\bar{q}}
\Aqq
\Afb
                        A_{\rm FB}
\GZ
                        \Gamma_Z
\backslash GW
                       \Gamma_W
\GH
                       \Gamma_H
\GamHad
                        \Gamma_{had}
\Gbb
                        \Gamma_{b\bar{b}}
\Rbb
                        R_{b\bar{b}}
\Gcc
                        \Gamma_{c\bar{c}}
\Gvis
                       \Gamma_{vis}
\Ginv
                        \Gamma_{inv}
```

12 atlasprocess.sty

Turn on including these definitions with the option process and off with the option process=false.

As an alternative you can use the hepparticles [1] package, which has uniform definitions for many Standard Model and BSM particles. Use the hepprocess=true instead of process=true to use the hepparticle definitions.

```
b \to \ell
\btol
                    c \to \ell
\ctol
                    b \to c \to \ell
\btoctol
                    J/\psi \rightarrow e^+e^-
\Jee
                    J/\psi \rightarrow \mu^+\mu^-
\Jmm
\Jmumu
                    J/\psi \rightarrow \mu^+\mu^-
                    W \rightarrow jj
\Wjj
                    t \rightarrow jjb
\tjjb
                    H \rightarrow b\bar{b}
\Hbb
                    H \rightarrow \gamma \gamma
\Hgg
                    H \to \ell\ell\ell\ell
\H1111
\Hmmmm
                    H \rightarrow \mu\mu\mu\mu
\Heeee
                    H \rightarrow eeee
\Z11
                    Z \to \ell \ell
                    Z \rightarrow \ell^+ \ell^-
\Zlplm
                    Z \rightarrow ee
\Zee
                     Z \rightarrow e^+ e^-
\Zepem
\Zmm
                    Z \rightarrow \mu\mu
\Zmpmm
                    Z \rightarrow \mu^{+}\mu^{-}
                    Z \rightarrow \tau \tau
\Ztt
                    Z \rightarrow \tau^+ \tau^-
\Ztptm
                     Z \to b\bar{b}
\Zbb
                    W \to \ell \nu
\Wln
                    W \rightarrow e \nu
\Wen
\Wmn
                    W \rightarrow \mu \nu
                    W \to \ell \nu
\Wlnu
\Wenu
                    W \rightarrow e \nu
\Wmunu
                    W \rightarrow \mu \nu
```

```
\Wqqbar
                  W \to q\bar{q}
\Amm
                 A \rightarrow \mu\mu
\Ztautau
                Z \rightarrow \tau \tau
\Wtaunu
                 W \to \tau \nu
\Atautau A \rightarrow \tau \tau
\Htautau H \rightarrow \tau \tau
\tWb
                 t \rightarrow Wb
                 W+ jets
\Wjets
                 Z + jets
\Zjets
                 \mathcal{B}(J/\psi \to \ell^+\ell^-)
\Brjl
```

13 atlashepprocess.sty

Turn on including these definitions with the option hepprocess and off with the option hepprocess=false.

The packages heppennames and/or hepnicenames contain many predefined particles, so you do not need to define them yourself. These packages load hepparticles, which can then be used to define more particles if you need them. One very nice feature of these packages is that you can switch between italic and upright symbols via an option.

This version of the document uses the particle and process options and so does not show the definitions made using the hepparticle and hepprocess options.

14 atlassnippets.sty

Turn on including these definitions with the option snippets and off with the option snippets=false.

\AntiktSnippet

The anti- k_t algorithm with a radius parameter of R = 0.4 is used to reconstruct jets with a four-momentum recombination scheme, using topo-clustersas inputs. Jet energy is calibrated to the hadronic scale with the effect of pile-up removed.

\TopoclusteringSnippet

Hadronic jets are reconstructed from calibrated three-dimensional topo-clusters. Clusters are constructed from calorimeter cells that are grouped together using a topological clustering algorithm. These objects provide a three-dimensional representation of energy depositions in the calorimeter and implement a nearest-neighbour noise suppression algorithm. The resulting topo-clustersare classified as either electromagnetic or hadronic based on their shape, depth and energy density. Energy corrections are then applied to the clusters in order to calibrate them to the appropriate energy scale for their classification. These corrections are collectively referred to as *local cluster weighting*, or LCW, and jets that are calibrated using this procedure are referred to as LCW jets [2].

\GroomingSnippet

Trimming removes subjets with $p_{\rm T}^i/p_{\rm T}^{\rm jet} < f_{\rm cut}$, where $p_{\rm T}^i$ is the transverse momentum of the $i^{\rm th}$ subjet, and $f_{\rm cut}=0.05$. Filtering proceeds similarly, but utilises the relative masses of the subjets defined and the original jet. For at least one of the configurations tested, trimming and filtering are both able to approximately eliminate the pile-up dependence of the jet mass.

\FastSimSnippet

The signal Monte Carlo samples were processed with a fast simulation that relies on a parameterisation of the calorimeter response [3]. The generation of the simulated event samples includes the effect of multiple pp interactions per bunch crossing, as well as the effect on the detector response due to interactions from bunch crossings before or after the one containing the hard interaction.

\PileupSnippet

15 atlasunit.sty

Turn on including these definitions with the option unit and off with the option unit=false.

```
\TeV
          TeV
\GeV
          GeV
\MeV
          MeV
          keV
\keV
          eV
\eV
          TeV/c
\TeVc
\GeVc
          GeV/c
\MeVc
          MeV/c
\keVc
          keV/c
\eVc
          eV/c
          \text{TeV}/c^2
\TeVcc
          \text{GeV}/c^2
\GeVcc
          MeV/c^2
\MeVcc
          keV/c^2
\keVcc
          eV/c^2
\eVcc
          fb^{-1}
\ifb
          pb^{-1}
\ipb
          nb^{-1}
\inb
\degr
```

Lower case versions of the units also exist, e.g. $\ensuremath{\mbox{\sc versions}}$ dev, $\ensuremath{\mbox{\sc versions}}$ and $\ensuremath{\mbox{\sc versions}}$

As mentioned above, it is highly recommended to use a units package instead of these definitions. siunitx is the preferred package; a good alternative is hepunits. If either of these packages are used atlasunit.sty is not needed.

Most units that are needed in ATLAS documents are already defined by siunitx or are defined in atlaspackage.sty. A selection of them is given below. In order to use them in your document the unit should be included in \si or \SI:

```
TeV
\si{\TeV}
si{GeV}
            GeV
            MeV
si{MeV}
si{\keV}
            keV
            eV
si{eV}
            TeV/c
\si{\TeVc}
            GeV/c
\si{\GeVc}
            MeV/c
\si{\MeVc}
\si{\keVc}
            keV/c
```

\si{\eVc} eV/c TeV/c^2 \si{\TeVcc} GeV/c^2 \si{\GeVcc} MeV/c^2 \si{\MeVcc} \si{\keVcc} keV/c^2 eV/c^2 \si{\eVcc} nb $si{nb}$ $si{pb}$ pb fb $si{fb}$ fb^{-1} \si{\per\fb} pb^{-1} \si{\per\pb} nb^{-1} $\si{\left\{ \right\} }$ fb^{-1} $si{ifb}$ pb^{-1} \si{\ipb} nb^{-1} \si{\inb} $si{Hz}$ Hz kHz $si{kHz}$ \si{\MHz} MHz GHz \si{\GHz} \si{\degr} $si{m}$ m $si{cm}$ cm \si{\mm} mm \si{\um} μm \si{\micron} μm

16 Changes

Version 05-08-00 of atlaslatex includes a new atlassnippets.sty style file. This is supposed to contain snippets of text that are useful in many papers and/or notes.

Version 01-08-01 of atlaslatex includes quite a few definitions from the Jet/Etmiss group. A new style file has been created atlasjetetmiss.sty that is not included by default. Some of the definitions from the Jet/ETmiss group are of more general use and so have been merged into existing style files:

atlasmisc.sty List of Monte Carlo generators expanded: \POWHEGBOX, \POWPYTHIA. Add MC macros with suffix 'V' for version number. \kt, \antikt, \Antikt, \LO, \NLO, \NLL, \NNLO, \muF, \muR. Added macros \Runone, \Runtwo, \Runthr, Added \radlength and \StoB. Added some standard b-tagging terms: \btag, \btagged, \bquark, \bquarks, \bjet, \bjets.

atlasparticle.sty Now includes \pp, \enu, \munu,

atlasprocess.sty Added \Zbb, \Ztt, \Zlplm, \Zepem, \Zmpmm, \Ztptm, \tWb, \Wqqbar, \Wlnu, \Wenu, \Wmunu, \Wjets, \Zjets. The definition of \Hllll was corrected.

atlasheavyion.sty \pp moved to atlasparticle.sty.

This version also introduced the (optional) use of the heppennames package. The style files atlashepparticle.sty and atlashepparticle.sty and atlashepprocess.sty are intended to replace atlasparticle.sty and atlasprocess.sty. Several particle definitions were removed from the atlasparticle package, as they just enable a few Greek letters: π , η and ψ to be used directly in text mode. In addition, the primed Υ resonances, e.g. Υ'' , as well as D^{**} were removed. as the official names are $\Upsilon(3S)$ etc.,

The definitions of MeV, GeV etc. in atlasunit.sty were updated in order to remove the if tests in them. The if tests caused a problem in a paper draft, although the reason was not understood. The new definitions do not introduce extra space before the unit in math mode.

17 Old macros

With the introduction of atlaslatex several macro names have been changed to make them more consistent. A few have been removed. The changes include:

- Kaons now have a capital 'K' in the macro name, e.g. \Kplus for K^+ ;
- \Ztau, \Wtau, \Htau \Atau have been replaced by \Ztautau, \Wtautau, \Htautau \Atautau;
- \Ups replaces \ups; the use of \ups to produce \Ups in text mode has been removed;
- \cm has been removed, as it was the only length unit defined for text and math mode;
- \mass has been removed, as \twomass can do the same thing and the name is more intuitive;
- \mA has been removed as it conflicts with siunitx Version 1, which uses the name for milliamp.
- \mathcal rather than \mathscr is recommended for luminosity and aplanarity.

Quite a few macros are more related to Z physics than they are to LHC physics and have been moved to the atlasother.sty file, which is not included by default. There are also macros for various decay processes, atlasprocess.sty which are not included by default, but may be useful for how you can define your favourite process.

It used to be the case that you had to use \MET{} rather than just \MET to get the spacing right, as somehow xspace did not do a good job for $E_T^{\rm miss}$. However, with the latest version of the packages both forms work fine. You can compare $E_T^{\rm miss}$ and $E_T^{\rm miss}$ and see that the spacing is correct in both cases.

References

- [1] A. Buckley, *The hepparticles package for LTEX*, URL: https://www.ctan.org/pkg/hepparticles.
- [2] ATLAS Collaboration, *Jet energy measurement and its systematic uncertainty in proton–proton collisions at* $\sqrt{s} = 7$ *TeV with the ATLAS detector*, Eur. Phys. J. C **75** (2015) 17, arXiv: 1406.0076 [hep-ex].
- [3] ATLAS Collaboration, *The ATLAS Simulation Infrastructure*, Eur. Phys. J. C **70** (2010) 823, arXiv: 1005.4568 [physics.ins-det].