ATLAS Note

October 12, 2018

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 05-08-00 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 USenglish.

Contents

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 TeX 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 `hepnicenames`, 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 heppparticles [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.

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

Generic macros \taup[1] and \Ups[1] are available. They are defined such that \taup{3} produces $\tau_{\text{3-prong}}$ and \Ups{3} produces $\Upsilon(3S)$.

3 atlashepparticle.sty

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

These definitions use the heppparticles [1] package, which has uniform definitions for many Standard Model and BSM particles. The names used are those in heppennames. The package loads heppparticles, 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.

\pp	pp
\pbar	$\bar{p}$
\ppbar	$p\bar{p}$
\tbar	$\bar{t}$
\ttbar	$t\bar{t}$
\bbar	$\bar{b}$
\bbar	$\bar{b}$
\bbbar	$b\bar{b}$
\cbar	$\bar{c}$
\ccbar	$c\bar{c}$
\sbar	$\bar{s}$
\ssbar	$s\bar{s}$
\ubar	$\bar{u}$
\uubar	$u\bar{u}$
\dbar	$\bar{d}$
\ddbar	$d\bar{d}$
\fbar	$\bar{f}$
\ffbar	$f\bar{f}$
\qbar	$\bar{q}$
\qqbar	$q\bar{q}$
\nbar	$\bar{\nu}$
\nnbar	$\nu\bar{\nu}$
\ee	e^+e^-
\epm	$e^\pm$
\epem	e^+e^-

\mumu	$\mu^+\mu^-$
\tautau	$\tau^+\tau^-$
\leplep	$\ell^+\ell^-$
\ellell	$\ell^+\ell^-$
\enu	$e\nu$
\munu	$\mu\nu$
\lnu	$\ell\nu$
\Zzero	Z
\Zboson	Z
\Wplus	W^+
\Wminus	W^-
\Wboson	W
\Wpm	$W^\pm$
\Wmp	$W^\mp$
\taulep	τ_{lep}
\tauhad	τ_{had}
\tauhadvis	$\tau_{\text{had-vis}}$
\pizero	π^0
\piplus	π^+
\piminus	π^-
\pipm	$\pi^\pm$
\pimp	$\pi^\mp$
\etaprime	η'
\Kzero	K^0
\Kzerobar	$\overline{K}^0$
\kaon	K
\Kplus	K^+
\Kminus	K^-
\KzeroL	K^0_L
\Kzerol	K^0_L
\Klong	K^0_L
\KzeroS	K^0_S
\Kzeros	K^0_S
\Kshort	K^0_S
\Kstar	K^*
\jpsi	J/ψ
\Jpsi	J/ψ
\psip	$\psi(2S)$

\chic	χ_c
\UoneS	$\Upsilon(1S)$
\chib	χ_b
\Dstar	D^*
\Bd	B^0_d
\Bs	B^0_s
\Bu	B_u
\Bc	B_c
\Lb	Λ_b
\Bstar	B^*
\BoBo	B^0–$\overline{B}^0$
\BodBod	B^0_d–$\overline{B}^0_d$
\BosBos	B^0_s–$\overline{B}^0_s$

Generic macros `\taup[1]` and `\Ups[1]` are available. They are defined such that `\taup{3}` produces $\tau_{\text{3-prong}}$ and `\Ups{3}` produces $\Upsilon(3S)$.

4 atlasjournal.sty

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

`\AcPA`	Acta Phys. Austriaca
`\ARevNS`	Ann. Rev. Nucl. Sci.
`\CPC`	Comp. Phys. Comm.
`\EPJ`	Eur. Phys. J.
`\EPJC`	Eur. Phys. J. C
`\FortP`	Fortschr. Phys.
`\IJMP`	Int. J. Mod. Phys.
`\JETP`	Sov. Phys. JETP
`\JETPL`	JETP Lett.
`\JaFi`	Jad. Fiz.
`\JMP`	J. Math. Phys.
`\MPL`	Mod. Phys. Lett.
`\NCim`	Nuovo Cimento
`\NIM`	Nucl. Instrum. Meth.
`\NIMA`	Nucl. Instrum. Meth. A
`\NP`	Nucl. Phys.
`\NPB`	Nucl. Phys. B
`\PL`	Phys. Lett.
`\PLB`	Phys. Lett. B
`\PR`	Phys. Rev.
`\PRC`	Phys. Rev. C
`\PRD`	Phys. Rev. D
`\PRL`	Phys. Rev. Lett.
`\PRep`	Phys. Rep.
`\RMP`	Rev. Mod. Phys.
`\ZfP`	Z. Phys.
`\collab`	Collaboration

5 atlasmisc.sty

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

`\pT`	p_{T}
`\pt`	p_{T}
`\ET`	E_{T}
`\eT`	E_{T}
`\et`	E_{T}
`\HT`	H_{T}
`\pTsq`	p_{T}^{2}
`\MET`	$E_{\mathrm{T}}^{\mathrm{miss}}$
`\met`	$E_{\mathrm{T}}^{\mathrm{miss}}$
`\sumET`	$\sum E_{\mathrm{T}}$
`\EjetRec`	E_{rec}
`\PjetRec`	p_{rec}
`\EjetTru`	E_{true}
`\PjetTru`	p_{true}
`\EjetDM`	E_{DM}
`\Rcone`	R_{cone}
`\abseta`	$\lvert\eta\rvert$
`\Ecm`	E_{cm}
`\rts`	$\sqrt{s}$
`\sqs`	$\sqrt{s}$
`\Nevt`	N_{evt}
`\zvtx`	z_{vtx}
`\dzero`	d_0
`\zzsth`	$z_0 \sin(\theta)$
`\RunOne`	Run 1
`\RunTwo`	Run 2
`\RunThr`	Run 3
`\kt`	k_t
`\antikt`	anti-k_t
`\Antikt`	Anti-k_t
`\pileup`	pileup
`\Pileup`	Pileup
`\pileup`	pileup

\Pileup	Pileup
\btag	b-tagging
\btagged	b-tagged
\bquark	b-quark
\bquarks	b-quarks
\bjet	b-jet
\bjets	b-jets
\mh	m_h
\mW	m_W
\mZ	m_Z
\mH	m_H
\ACERMC	AcerMC
\ALPGEN	Alpgen
\GEANT	Geant
\Herwigpp	Herwig++
\HERWIGpp	Herwig++
\Herwig	Herwig
\HERWIG	Herwig
\JIMMY	Jimmy
\MADSPIN	MadSpin
\MADGRAPH	MadGraph
\MGMCatNLO	MadGraph5_aMC@NLO
\MCatNLO	MC@NLO
\AMCatNLO	aMC@NLO
\MCFM	MCFM
\METOP	METop
\POWHEG	Powheg
\POWHEGBOX	Powheg-Box
\POWPYTHIA	Powheg+Pythia
\PROTOS	Protos
\PYTHIA	Pythia
\SHERPA	Sherpa
\Comphep	CompHEP
\Perugia	Perugia
\Prospino	Prospino
\LO	LO
\NLO	NLO
\NLL	NLL

\NNLO	NNLO
\muF	μ_{F}
\muR	μ_{R}
\ra	$\rightarrow$
\la	$\leftarrow$
\rarrow	$\rightarrow$
\larrow	$\leftarrow$
\lapprox	$\lesssim$
\rapprox	$\gtrsim$
\gam	γ
\stat	(stat.)
\syst	(syst.)
\radlength	X_0
\StoB	S/B
\alphas	α_{S}
\NF	N_{F}
\NC	N_{C}
\CF	C_{F}
\CA	C_{A}
\TF	T_{F}
\Lms	$\Lambda_{\overline{\mathrm{MS}}}$
\Lmsfive	$\Lambda_{\overline{\mathrm{MS}}}^{(5)}$
\kperp	$k_{\perp}$
\Vcb	$\lvert V_{cb}\rvert$
\Vub	$\lvert V_{ub}\rvert$
\Vtd	$\lvert V_{td}\rvert$
\Vts	$\lvert V_{ts}\rvert$
\Vtb	$\lvert V_{tb}\rvert$
\Vcs	$\lvert V_{cs}\rvert$
\Vud	$\lvert V_{ud}\rvert$
\Vus	$\lvert V_{us}\rvert$
\Vcd	$\lvert V_{cd}\rvert$

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

```
\[\eqalign{a \to & b+c\\
   & \dk & e+f \\
   && \dk g+h}
\]
```

produces

$$\begin{array}{lll} a \to b+c & & \\ \quad \vert\!\longrightarrow & e+f & \\ & \quad \vert\!\longrightarrow & g+h \end{array}$$

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

The following macro names have been changed: `\ptsq` → `\pTsq`.

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:

`\App{1}`	Appendix 1
`\Eqn{1}`	Eq. 1
`\Fig{1}`	Figure 1
`\Ref{1}`	Ref. 1
`\Sect{1}`	Section 1
`\Tab{1}`	Table 1
`\Apps{1}{4}`	Appendices 1 and 4
`\Eqns{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
`\Apprange{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
`\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 (˜) 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 ±.

\Azero	A^0
\hzero	h^0
\Hzero	H^0
\Hboson	H
\Hplus	H^+
\Hminus	H^-
\Hpm	$H^\pm$
\Hmp	$H^\mp$
\ggino	$\tilde{\chi}$
\chinop	$\tilde{\chi}^+$
\chinom	$\tilde{\chi}^-$
\chinopm	$\tilde{\chi}^\pm$
\chinomp	$\tilde{\chi}^\mp$
\chinoonep	$\tilde{\chi}_1^+$
\chinoonem	$\tilde{\chi}_1^-$
\chinoonepm	$\tilde{\chi}_1^\pm$
\chinotwop	$\tilde{\chi}_2^+$
\chinotwom	$\tilde{\chi}_2^-$
\chinotwopm	$\tilde{\chi}_2^\pm$
\nino	$\tilde{\chi}^0$
\ninoone	$\tilde{\chi}_1^0$
\ninotwo	$\tilde{\chi}_2^0$
\ninothree	$\tilde{\chi}_3^0$
\ninofour	$\tilde{\chi}_4^0$
\gravino	$\tilde{G}$

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

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_{part}
\avgNpart	$\langle N_{\text{part}}\rangle$
\Ncoll	N_{coll}
\avgNcoll	$\langle N_{\text{coll}}\rangle$
\TA	T_{A}
\avgTA	$\langle T_{\text{A}}\rangle$
\TPb	T_{Pb}
\avgTPb	$\langle T_{\text{Pb}}\rangle$
\TAA	T_{AA}
\avgTAA	$\langle T_{\text{AA}}\rangle$
\TAB	T_{AB}
\avgTAB	$\langle T_{\text{AB}}\rangle$
\TpPb	$T_{p\text{Pb}}$
\avgTpPb	$\langle T_{p\text{Pb}}\rangle$
\Gl	Glauber
\GG	Glauber–Gribov
\sqn	$\sqrt{s_{\text{NN}}}$
\lns	$\ln(\sqrt{s})$
\sumETPb	$\Sigma E_{\text{T}}^{\text{Pb}}$
\sumETp	ΣE_{T}^{p}
\sumETA	$\Sigma E_{\text{T}}^{\text{A}}$
\RAA	R_{AA}
\RCP	R_{CP}
\RpA	$R_{p\text{A}}$
\RpPb	$R_{p\text{Pb}}$
\dNchdeta	$dN_{\text{ch}}/d\eta$
\dNevtdET	$dN_{\text{evt}}/dE_{\text{T}}$
\ystar	y^{*}
\ycms	y_{CM}
\ygappb	$\Delta\eta_{\text{gap}}^{\text{Pb}}$
\ygapp	$\Delta\eta_{\text{gap}}^{p}$
\fgap	f_{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	$2 \to 2$
\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_{filt}
\Rfilt	R_{filt}
\ymin	y_{min}
\fcut	f_{cut}
\Rsub	R_{sub}

\mufrac	μ_{frac}
\Rcut	R_{cut}
\zcut	z_{cut}
\ftile	f_{Tile0}
\fem	f_{LAr3}
\fpres	f_{PS}
\fhec	f_{HEC0}
\ffcal	f_{FCal1}
\central	$0.3 \le \lvert\eta\rvert < 0.8$
\ecap	$2.1 \le \lvert\eta\rvert < 2.8$
\forward	$3.6 \le \lvert\eta\rvert < 4.5$
\Npv	N_{PV}
\Nref	$N_{\text{PV}}^{\text{ref}}$
\Navg	$\langle N_{\text{PV}} \rangle$
\avgmu	$\langle \mu \rangle$
\JES	JES
\JMS	JMS
\EMJES	EM+JES
\GCWJES	GCW+JES
\LCWJES	LCW+JES
\EM	EM
\GCW	GCW
\LCW	LCW
\GSL	GSL
\GS	GS
\MTF	MTF
\MPF	MPF
\Njet	N_{jet}
\njet	N_{jet}
\ETjet	$E_{\text{T}}^{\text{jet}}$
\etjet	$E_{\text{T}}^{\text{jet}}$
\pTavg	$p_{\text{T}}^{\text{avg}}$
\ptavg	$p_{\text{T}}^{\text{avg}}$
\pTjet	$p_{\text{T}}^{\text{jet}}$
\ptjet	$p_{\text{T}}^{\text{jet}}$
\pTcorr	$p_{\text{T}}^{\text{corr}}$
\ptcorr	$p_{\text{T}}^{\text{corr}}$
\pTjeti	$p_{\text{T},i}^{\text{jet}}$

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

`\RpT`	$R_{p_{\mathrm{T}}}$
`\JVT`	JVT
`\ghostpt`	g_t
`\ghostptavg`	$\langle g_t \rangle$
`\ghostfm`	g_μ
`\ghostfmi`	$g_{\mu,i}$
`\ghostdensity`	ν_g
`\ghostrho`	$\nu_g \langle g_t \rangle$
`\Aghost`	A_g
`\Amu`	A_μ
`\Amui`	$A_{\mu,i}$
`\jetarea`	A^{jet}
`\jetareafm`	A^{jet}_μ
`\jetareai`	A^{jet}_i
`\Rkt`	R_{k_t}
`\pTmuslope`	$\partial\langle\Delta p_{\mathrm{T}}\rangle/\partial\langle\mu\rangle$
`\ptmuslope`	$\partial\langle\Delta p_{\mathrm{T}}\rangle/\partial\langle\mu\rangle$
`\pTnpvslope`	$\partial\langle\Delta p_{\mathrm{T}}\rangle/\partial N_{\mathrm{PV}}$
`\ptnpvslope`	$\partial\langle\Delta p_{\mathrm{T}}\rangle/\partial N_{\mathrm{PV}}$
`\pTmuunc`	$\Delta\left(\partial\langle\Delta p_{\mathrm{T}}\rangle/\partial\langle\mu\rangle\right)$
`\ptmuunc`	$\Delta\left(\partial\langle\Delta p_{\mathrm{T}}\rangle/\partial\langle\mu\rangle\right)$
`\pTnpvunc`	$\Delta\left(\partial\langle\Delta p_{\mathrm{T}}\rangle/\partial N_{\mathrm{PV}}\right)$
`\ptnpvunc`	$\Delta\left(\partial\langle\Delta p_{\mathrm{T}}\rangle/\partial N_{\mathrm{PV}}\right)$
`\sumPt`	$\sum \vec{p}_{\mathrm{T}}$
`\sumpt`	$\sum \vec{p}_{\mathrm{T}}$
`\sumpTtrk`	$\sum p_{\mathrm{T}}^{\mathrm{track}}$
`\sumpttrk`	$\sum p_{\mathrm{T}}^{\mathrm{track}}$
`\nPUtrk`	$n_{\mathrm{trk}}^{\mathrm{PU}}$
`\mjet`	m^{jet}
`\mlead`	m^{jet}_1
`\mleadavg`	$\langle m^{\mathrm{jet}}_1\rangle$
`\Mjet`	m^{jet}
`\massjet`	m^{jet}
`\masscorr`	m^{corr}
`\mthresh`	$M_{\mathrm{threshold}}$
`\mjetavg`	$\langle m^{\mathrm{jet}}\rangle$
`\masstrkjet`	$m^{\mathrm{track\ jet}}$
`\width`	w
`\wcalo`	w^{calo}
`\wtrk`	w^{track}
`\shapeV`	$\mathcal{V}$
`\pTsubjet`	$p_{\mathrm{T}}^{\mathrm{subjet}}$
`\ptsubjet`	$p_{\mathrm{T}}^{\mathrm{subjet}}$
`\sjone`	j_1
`\sjtwo`	j_2
`\msubjone`	m^{j_1}
`\msubjtwo`	m^{j_2}
`\pTsubji`	p_{T}^{i}
`\ptsubji`	p_{T}^{i}
`\pTsubjone`	$p_{\mathrm{T}}^{j_1}$
`\ptsubjone`	$p_{\mathrm{T}}^{j_1}$
`\pTsubjtwo`	$p_{\mathrm{T}}^{j_2}$
`\ptsubjtwo`	$p_{\mathrm{T}}^{j_2}$
`\Rsubjets`	R_{j_1,j_2}
`\DRsubjets`	$\Delta R_{j_1,j_2}$
`\yij`	y_{ij}
`\dcut`	d_{cut}
`\dmin`	d_{min}
`\dij`	d_{ij}
`\Dij`	$\sqrt{d_{ij}}$
`\Donetwo`	$\sqrt{d_{12}}$
`\Dtwothr`	$\sqrt{d_{23}}$
`\yonetwo`	y_1
`\ytwothr`	y_2
`\yonetwoDef`	$y_1 = \sqrt{d_{12}}/m^{\mathrm{jet}}$
`\ytwothrDef`	$y_2 = \sqrt{d_{23}}/m^{\mathrm{jet}}$
`\xj`	x_J
`\jetFunc`	$J^{(eik),c}(m^{\mathrm{jet}}, p_{\mathrm{T}}, R)$
`\tauone`	τ_1
`\tautwo`	τ_2
`\tauthr`	τ_3
`\tauN`	τ_N
`\tautwoone`	τ_{21}
`\tauthrtwo`	τ_{32}
`\dip`	$\mathcal{D}$
`\diponetwo`	$\mathcal{D}_{12}$

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

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

10 atlasmath.sty

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

`\boxsq`	$\square^2$
`\grad`	$\boldsymbol{\nabla}$

The macro `\spinor` is also defined. `\spinor{u}` produces $\begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \end{pmatrix}$.

11 atlasother.sty

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

\etpt	$1/p_{\mathrm{T}} - 1/E_{\mathrm{T}}$
\etptsig	$(1/p_{\mathrm{T}} - 1/E_{\mathrm{T}})/(\sigma(1/p_{\mathrm{T}}))$
\begL	$10^{31}\,\mathrm{cm}^{-2}\,\mathrm{s}^{-1}$
\lowL	$10^{33}\,\mathrm{cm}^{-2}\,\mathrm{s}^{-1}$
\highL	$10^{34}\,\mathrm{cm}^{-2}\,\mathrm{s}^{-1}$
\Epsb	ϵ_b
\Epsc	ϵ_c
\Mtau	m_τ
\swsq	$\sin^2\theta_{\mathrm{W}}$
\swel	$\sin^2\theta_{\mathrm{eff}}^{\mathrm{lept}}$
\swsqb	$\sin^2\overline{\theta}_{\mathrm{W}}$
\swsqon	$\sin^2\theta_{\mathrm{W}} \equiv 1 - m_W^2/m_Z^2$
\gv	g_{V}
\ga	g_{A}
\gvbar	$\bar{g}_{\mathrm{V}}$
\gabar	$\bar{g}_{\mathrm{A}}$
\Zzv	Z^*
\Abb	$A_{b\bar{b}}$
\Acc	$A_{c\bar{c}}$
\Aqq	$A_{q\bar{q}}$
\Afb	A_{FB}
\GZ	Γ_Z
\GW	Γ_W
\GH	Γ_H
\GamHad	Γ_{had}
\Gbb	$\Gamma_{b\bar{b}}$
\Rbb	$R_{b\bar{b}}$
\Gcc	$\Gamma_{c\bar{c}}$
\Gvis	Γ_{vis}
\Ginv	Γ_{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.

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

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.

\btol	$b \to \ell$
\ctol	$c \to \ell$
\btoctol	$b \to c \to \ell$
\Jee	$J/\psi \to e^{+}e^{-}$
\Jmm	$J/\psi \to \mu^{+}\mu^{-}$
\Jmumu	$J/\psi \to \mu^{+}\mu^{-}$
\Wjj	$W \to jj$
\tjjb	$t \to jjb$
\Hbb	$H \to b\bar{b}$
\Hgg	$H \to \gamma\gamma$
\Hllll	$H \to \ell\ell\ell\ell$
\Hmmmm	$H \to \mu\mu\mu\mu$
\Heeee	$H \to eeee$
\Zll	$Z \to \ell\ell$
\Zlplm	$Z \to \ell^{+}\ell^{-}$
\Zee	$Z \to ee$
\Zepem	$Z \to e^{+}e^{-}$
\Zmm	$Z \to \mu\mu$
\Zmpmm	$Z \to \mu^{+}\mu^{-}$
\Ztt	$Z \to \tau\tau$
\Ztptm	$Z \to \tau^{+}\tau^{-}$
\Zbb	$Z \to b\bar{b}$
\Wln	$W \to \ell\nu$
\Wen	$W \to e\nu$
\Wmn	$W \to \mu\nu$
\Wlnu	$W \to \ell\nu$
\Wenu	$W \to e\nu$
\Wmunu	$W \to \mu\nu$
\Wqqbar	$W \to q\bar{q}$
\Amm	$A \to \mu\mu$
\Ztautau	$Z \to \tau\tau$
\Wtaunu	$W \to \tau\nu$
\Atautau	$A \to \tau\tau$
\Htautau	$H \to \tau\tau$
\tWb	$t \to Wb$
\Wjets	$W+$jets
\Zjets	$Z+$jets
\Brjl	$\mathrm{Br}(J/\psi \to \ell^{+}\ell^{-})$

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 pileup 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 $p_{\mathrm{T}}^{i}/p_{\mathrm{T}}^{\mathrm{jet}} < f_{\mathrm{cut}}$, where p_{T}^{i} is the transverse momentum of the i^{th} subjet, and $f_{\mathrm{cut}} = 0.05$. 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 pileup 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].
`\PileupSnippet`	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.

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

Lower case versions of the units also exist, e.g. \tev, \gev, \mev, \kev, and \ev.

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:

\si{\TeV}	TeV
\si{\GeV}	GeV
\si{\MeV}	MeV
\si{\keV}	keV
\si{\eV}	eV
\si{\TeVc}	TeV/c
\si{\GeVc}	GeV/c
\si{\MeVc}	MeV/c
\si{\keVc}	keV/c
\si{\eVc}	eV/c
\si{\TeVcc}	TeV/c^2
\si{\GeVcc}	GeV/c^2
\si{\MeVcc}	MeV/c^2

`\si{\keVcc}`	keV/c^2
`\si{\eVcc}`	eV/c^2
`\si{\nb}`	nb
`\si{\pb}`	pb
`\si{\fb}`	fb
`\si{\per\fb}`	fb^{-1}
`\si{\per\pb}`	pb^{-1}
`\si{\per\nb}`	nb^{-1}
`\si{\ifb}`	fb^{-1}
`\si{\ipb}`	pb^{-1}
`\si{\inb}`	nb^{-1}
`\si{\Hz}`	Hz
`\si{\kHz}`	kHz
`\si{\MHz}`	MHz
`\si{\GHz}`	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 `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 $\mathit{\Upsilon}$(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 Υ 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 $E_{\mathrm{T}}^{\mathrm{miss}}$. However, with the latest version of the packages both forms work fine. You can compare $E_{\mathrm{T}}^{\mathrm{miss}}$ and $E_{\mathrm{T}}^{\mathrm{miss}}$ and see that the spacing is correct in both cases.

References

[1] A. Buckley, *The* `hepparticles` *package for LaTeX*, 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].