



# ATLAS Note

3rd May 2021



## Symbols defined in `atlasphysics.sty`

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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 11.1.0 of the ATLAS  $\text{\LaTeX}$  package. The  $\text{\TeX}$  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

<a href="#">1 atlasphysics.sty style file</a>	<a href="#">2</a>
<a href="#">2 atlasparticle.sty</a>	<a href="#">5</a>
<a href="#">3 atlashepparticle.sty</a>	<a href="#">6</a>
<a href="#">4 atlasjournal.sty</a>	<a href="#">7</a>
<a href="#">5 atlasmisc.sty</a>	<a href="#">7</a>
<a href="#">6 atlasxref.sty</a>	<a href="#">10</a>
<a href="#">7 atlasbsm.sty</a>	<a href="#">10</a>
<a href="#">8 atlasheavyion.sty</a>	<a href="#">11</a>
<a href="#">9 atlasjetetmiss.sty</a>	<a href="#">12</a>
<a href="#">10 atlasmath.sty</a>	<a href="#">16</a>
<a href="#">11 atlasother.sty</a>	<a href="#">16</a>
<a href="#">12 atlasprocess.sty</a>	<a href="#">17</a>
<a href="#">13 atlashepprocess.sty</a>	<a href="#">18</a>
<a href="#">14 atlassnippets.sty</a>	<a href="#">19</a>
<a href="#">15 atlasunit.sty</a>	<a href="#">20</a>
<a href="#">16 Changes</a>	<a href="#">21</a>
<a href="#">17 Old macros</a>	<a href="#">21</a>

## 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 be included in the preamble of your paper with the usual syntax:

```
\usepackage{atlasphysics}
```

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  $\text{\TeX}$  Live like 2013.

**texmf** (true) Use the syntax `\usepackage{package}` instead of `\usepackage{\ATLASLATEXPATHPATH 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.

**N: 10.0.0** `\ATLASLATEXPATHPATH` is no longer used, so the option `texmf` has been set to true.

If the option `texmf` is included, the subfiles are included using the command: `\RequirePackage{atlasparticle}` etc. instead of `\RequirePackage{\ATLASLATEXPATHPATH atlasparticle}`.

**N: 10.0.0** This is now the default option.

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 `hepnicensames`, 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 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.

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

<code>\enu</code>	$e\nu$
<code>\munu</code>	$\mu\nu$
<code>\lnu</code>	$\ell\nu$
<code>\taulep</code>	$\tau_{\text{lep}}$
<code>\tauuhad</code>	$\tau_{\text{had}}$
<code>\tauuhadvis</code>	$\tau_{\text{had-vis}}$
<code>\Zzero</code>	$Z$
<code>\Zboson</code>	$Z$
<code>\Wplus</code>	$W^+$
<code>\Wminus</code>	$W^-$
<code>\Wboson</code>	$W$
<code>\Wpm</code>	$W^\pm$
<code>\Wmp</code>	$W^\mp$
<code>\pizero</code>	$\pi^0$
<code>\piplus</code>	$\pi^+$
<code>\piminus</code>	$\pi^-$
<code>\pipm</code>	$\pi^\pm$
<code>\pimp</code>	$\pi^\mp$
<code>\etaprime</code>	$\eta'$
<code>\Kzero</code>	$K^0$
<code>\Kzerobar</code>	$\bar{K}^0$
<code>\kaon</code>	$K$
<code>\Kplus</code>	$K^+$
<code>\Kminus</code>	$K^-$
<code>\KzeroL</code>	$K_L^0$
<code>\Kzerol</code>	$K_L^0$
<code>\Klong</code>	$K_L^0$
<code>\KzeroS</code>	$K_S^0$
<code>\Kzeros</code>	$K_S^0$
<code>\Kshort</code>	$K_S^0$
<code>\Kstar</code>	$K^*$
<code>\jpsi</code>	$J/\psi$
<code>\Jpsi</code>	$J/\psi$
<code>\psip</code>	$\psi(2S)$
<code>\chic</code>	$\chi_c$
<code>\UoneS</code>	$\U(1S)$
<code>\chib</code>	$\chi_b$
<code>\Dstar</code>	$D^*$

<code>\Bd</code>	$B_d^0$
<code>\Bs</code>	$B_s^0$
<code>\Bu</code>	$B_u$
<code>\Bc</code>	$B_c$
<code>\Lb</code>	$\Lambda_b$
<code>\Bstar</code>	$B^*$
<code>\BoBo</code>	$B^0-\bar{B}^0$
<code>\BodBod</code>	$B_d^0-\bar{B}_d^0$
<code>\BosBos</code>	$B_s^0-\bar{B}_s^0$

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

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

## 5 atlasmisc.sty

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

<code>\pT</code>	$p_T$
<code>\pt</code>	$p_T$
<code>\ET</code>	$E_T$
<code>\eT</code>	$E_T$
<code>\et</code>	$E_T$
<code>\HT</code>	$H_T$
<code>\pTsqr</code>	$p_T^2$
<code>\MET</code>	$E_T^{\text{miss}}$
<code>\met</code>	$E_T^{\text{miss}}$
<code>\sumET</code>	$\sum E_T$
<code>\EjetRec</code>	$E_{\text{rec}}$
<code>\PjetRec</code>	$p_{\text{rec}}$
<code>\EjetTru</code>	$E_{\text{true}}$
<code>\PjetTru</code>	$p_{\text{true}}$
<code>\EjetDM</code>	$E_{\text{DM}}$
<code>\Rcone</code>	$R_{\text{cone}}$
<code>\abseta</code>	$ \eta $
<code>\Ecm</code>	$E_{\text{cm}}$
<code>\rts</code>	$\sqrt{s}$
<code>\sqs</code>	$\sqrt{s}$
<code>\Nevt</code>	$N_{\text{evt}}$
<code>\zvtx</code>	$z_{\text{vtx}}$
<code>\dzero</code>	$d_0$
<code>\zzsth</code>	$z_0 \sin(\theta)$
<code>\RunOne</code>	Run 1
<code>\RunTwo</code>	Run 2
<code>\RunThr</code>	Run 3
<code>\kt</code>	$k_t$
<code>\antikt</code>	anti- $k_t$
<code>\Antikt</code>	Anti- $k_t$
<code>\pileup</code>	pile-up
<code>\Pileup</code>	Pile-up
<code>\btag</code>	$b$ -tagging

\btagged	<i>b</i> -tagged	\PROPHECY	PROPHECY4F
\bquark	<i>b</i> -quark	\PROTOS	PROTOS
\bquarks	<i>b</i> -quarks	\Pythia	PYTHIA
\bjet	<i>b</i> -jet	\PYTHIA	PYTHIA
\bjets	<i>b</i> -jets	\RECOLA	RECOLA
\mh	$m_h$	\Sherpa	SHERPA
\mW	$m_W$	\SHERPA	SHERPA
\mZ	$m_Z$	\TOPpp	TOP++
\mH	$m_H$	\VBFNLO	VBFNLO
\ACERMC	ACERMC	\MGNLOHER	MADGRAPH5_aMC@NLO+HERWIG
\ALPGEN	ALPGEN	\MGNLOPY	MADGRAPH5_aMC@NLO+PYTHIA
\AMCatNLO	aMC@NLO	\MGHER	MADGRAPH5+HERWIG
\BLACKHAT	BLACKHAT	\MGPY	MADGRAPH5+PYTHIA
\CALCHEP	CALCHEP	\POWHER	POWHEG+HERWIG
\COLLIER	COLLIER	\POWPY	POWHEG+PYTHIA
\COMPHEP	COMPHEP	\SHERPABH	SHERPA+BLACKHAT
\EVTGEN	EVTGEN	\SHERPAOL	SHERPA+OPENLOOPS
\FEYNRULES	FEYNRULES	\ABM	ABM
\GGTOVV	GG2VV	\ABKM	ABKM
\GOSAM	GoSAM	\CT	CT
\HATHOR	HATHOR	\CTEQ	CTEQ
\Herwig	HERWIG	\GJR	GJR
\HERWIG	HERWIG	\HERAPDF	HERAPDF
\HERWIGpp	HERWIG++	\LUXQED	LUXQED
\HRES	HRES	\MSTW	MSTW2008
\JIMMY	JIMMY	\MMHT	MMHT2014
\MADSPIN	MADSPIN	\MSHT	MSHT2020
\MADGRAPH	MADGRAPH	\NNPDF	NNPDF
\MGNLO	MADGRAPH5_aMC@NLO	\PDFforLHC	PDF4LHC
\MCatNLO	MC@NLO	\AUET	AUET2
\MCFM	MCFM	\AZNLO	AZNLO
\METOP	METOP	\FXFX	FxFx
\OPENLOOPS	OPENLOOPS	\GEANT	GEANT4
\POWHEG	POWHEG	\MENLOPS	MENLOPS
\POWHEGBOX	POWHEG BOX	\MEPSatLO	MEPS@LO
\POWHEGBOXRES	POWHEG BOX RES	\MEPSatNLO	MEPS@NLO
\PHOTOS	PHOTOS	\MINLO	MiNLO
\PHOTOSpp	PHOTOS++	\Monash	Monash



<code>\Perugia</code>	Perugia
<code>\Prospino</code>	Prospino
<code>\UEEE</code>	UE-EE-5
<code>\LO</code>	LO
<code>\NLO</code>	NLO
<code>\NLL</code>	NLL
<code>\NNLO</code>	NNLO
<code>\muF</code>	$\mu_f$
<code>\muQ</code>	$\mu_q$
<code>\muR</code>	$\mu_r$
<code>\hdamp</code>	$h_{\text{damp}}$
<code>\NLOEWvirt</code>	NLO EW <sub>virt</sub>
<code>\ra</code>	$\rightarrow$
<code>\la</code>	$\leftarrow$
<code>\rarrow</code>	$\rightarrow$
<code>\larrow</code>	$\leftarrow$
<code>\lapprox</code>	$\lesssim$
<code>\rapprox</code>	$\gtrsim$
<code>\gam</code>	$\gamma$
<code>\stat</code>	(stat.)
<code>\syst</code>	(syst.)
<code>\radlength</code>	$X_0$
<code>\StoB</code>	$S/B$
<code>\alphas</code>	$\alpha_s$
<code>\NF</code>	$N_F$
<code>\NC</code>	$N_C$
<code>\CF</code>	$C_F$
<code>\CA</code>	$C_A$
<code>\TF</code>	$T_F$
<code>\Lms</code>	$\Lambda_{\overline{\text{MS}}}$
<code>\Lmsfive</code>	$\Lambda_{\overline{\text{MS}}}^{(5)}$
<code>\kperp</code>	$k_{\perp}$
<code>\Vcb</code>	$ V_{cb} $
<code>\Vub</code>	$ V_{ub} $
<code>\Vtd</code>	$ V_{td} $
<code>\Vts</code>	$ V_{ts} $
<code>\Vtb</code>	$ V_{tb} $
<code>\Vcs</code>	$ V_{cs} $

<code>\Vud</code>	$ V_{ud} $
<code>\Vus</code>	$ V_{us} $
<code>\Vcd</code>	$ V_{cd} $

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

Monte Carlo generators and PDFs have an optional argument that allows you to include the version, e.g. `\PYTHIA[8]` to produce PYTHIA 8 or `\PYTHIA[(v8.160)]` to produce PYTHIA (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

$$\begin{array}{c}
 a \rightarrow b + c \\
 \quad \quad \quad \downarrow \\
 \quad \quad \quad \longrightarrow \quad e + f \\
 \quad \quad \quad \quad \quad \quad \downarrow \\
 \quad \quad \quad \quad \quad \quad \longrightarrow \quad g + h
 \end{array}$$

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

The following macro names have been changed:  
`\ptsq`  $\rightarrow$  `\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:

<code>\App{1}</code>	Appendix 1
<code>\Eqn{1}</code>	Eq. 1
<code>\Fig{1}</code>	Figure 1
<code>\Refn{1}</code>	Ref. 1
<code>\Sect{1}</code>	Section 1
<code>\Tab{1}</code>	Table 1
<code>\Apps{1}{4}</code>	Appendices 1 and 4
<code>\Eqns{1}{4}</code>	Eqs. 1 and 4
<code>\Figs{1}{4}</code>	Figures 1 and 4
<code>\Refns{1}{4}</code>	Refs. 1 and 4
<code>\Sects{1}{4}</code>	Sections 1 and 4
<code>\Tabs{1}{4}</code>	Tables 1 and 4
<code>\Apprange{1}{4}</code>	Appendices 1–4
<code>\Eqnrange{1}{4}</code>	Eqs. 1–4
<code>\Figrange{1}{4}</code>	Figures 1–4
<code>\Refrange{1}{4}</code>	Refs. 1–4
<code>\Sectrange{1}{4}</code>	Sections 1–4
<code>\Tabrange{1}{4}</code>	Tables 1–4

The idea is that you can adapt these definitions according to your own preferences (or those of a journal). Note that the macros `\Ref` and `\Refs` were renamed to `\Refn` and `\Refns` in `atlaslatex 08-00-00`, as `\Ref` is now defined in the `hyperref` package.

## 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 ( $\tilde{\phantom{x}}$ ) 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  $\pm$ .

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

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

## 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`.

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

<code>\sumETA</code>	$\Sigma E_T^A$
<code>\RAA</code>	$R_{AA}$
<code>\RCP</code>	$R_{CP}$
<code>\RpA</code>	$R_{pA}$
<code>\RpPb</code>	$R_{pPb}$
<code>\dNchdeta</code>	$dN_{ch}/d\eta$
<code>\dNevtdET</code>	$dN_{evt}/dE_T$
<code>\ystar</code>	$y^*$
<code>\ycms</code>	$y_{CM}$
<code>\ygappb</code>	$\Delta\eta_{gap}^{Pb}$
<code>\ygapp</code>	$\Delta\eta_{gap}^p$
<code>\fgap</code>	$f_{gap}$

## 9 atlasjetetmiss.sty

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

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

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

<code>\ptjeti</code>	$p_{\text{T},i}^{\text{jet}}$
<code>\pT recoil</code>	$p_{\text{T}}^{\text{recoil}}$
<code>\ptrecoil</code>	$p_{\text{T}}^{\text{recoil}}$
<code>\pT leading</code>	$p_{\text{T}}^{\text{leading}}$
<code>\ptleading</code>	$p_{\text{T}}^{\text{leading}}$
<code>\pTjetEM</code>	$p_{\text{T},\text{EM}}^{\text{jet}}$
<code>\ptjetEM</code>	$p_{\text{T},\text{EM}}^{\text{jet}}$
<code>\pThat</code>	$\hat{p}_{\text{T}}$
<code>\pthat</code>	$\hat{p}_{\text{T}}$
<code>\pTprobe</code>	$p_{\text{T}}^{\text{probe}}$
<code>\ptprobe</code>	$p_{\text{T}}^{\text{probe}}$
<code>\pTref</code>	$p_{\text{T}}^{\text{ref}}$
<code>\ptref</code>	$p_{\text{T}}^{\text{ref}}$
<code>\pToff</code>	$O$
<code>\ptoff</code>	$O$
<code>\pToffjet</code>	$O^{\text{jet}}$
<code>\ptoffjet</code>	$O^{\text{jet}}$
<code>\pTZ</code>	$p_{\text{T}}^Z$
<code>\ptZ</code>	$p_{\text{T}}^Z$
<code>\pTtrue</code>	$p_{\text{T}}^{\text{true}}$
<code>\pttrue</code>	$p_{\text{T}}^{\text{true}}$
<code>\pTtruth</code>	$p_{\text{T}}^{\text{true}}$
<code>\pttruth</code>	$p_{\text{T}}^{\text{true}}$
<code>\pTreco</code>	$p_{\text{T}}^{\text{reco}}$
<code>\ptreco</code>	$p_{\text{T}}^{\text{reco}}$
<code>\pTtrk</code>	$p_{\text{T}}^{\text{track}}$
<code>\pttrk</code>	$p_{\text{T}}^{\text{track}}$
<code>\ptrk</code>	$p_{\text{T}}^{\text{track}}$
<code>\pTtrkjet</code>	$p_{\text{T}}^{\text{track jet}}$
<code>\pttrkjet</code>	$p_{\text{T}}^{\text{track jet}}$
<code>\ntrk</code>	$n_{\text{track}}$
<code>\EoverP</code>	$E/p$
<code>\Etrue</code>	$E^{\text{true}}$
<code>\Etruth</code>	$E^{\text{true}}$
<code>\Ecalo</code>	$E^{\text{jet}}$
<code>\EcaloEM</code>	$E_{\text{EM}}^{\text{jet}}$
<code>\asym</code>	$\mathcal{A}$
<code>\Response</code>	$\mathcal{R}$

<code>\Rcalo</code>	$\mathcal{R}^{\text{jet}}$	<code>\RpT</code>	$R_{p_T}$
<code>\Rcalom</code>	$\mathcal{R}_m^{\text{jet}}$	<code>\JVT</code>	JVT
<code>\RcaloEM</code>	$\mathcal{R}_{\text{EM}}^{\text{jet}}$	<code>\ghostpt</code>	$g_t$
<code>\RMPF</code>	$\mathcal{R}_{\text{MPF}}^{\text{jet}}$	<code>\ghostptavg</code>	$\langle g_t \rangle$
<code>\EcaloCALIB</code>	$E^{\text{jet}}$	<code>\ghostfm</code>	$g_\mu$
<code>\RcaloCALIB</code>	$\mathcal{R}^{\text{jet}}$	<code>\ghostfmi</code>	$g_{\mu,i}$
<code>\EcaloEMJES</code>	$E_{\text{EM+JES}}^{\text{jet}}$	<code>\ghostdensity</code>	$\nu_g$
<code>\RcaloEMJES</code>	$\mathcal{R}_{\text{EM+JES}}^{\text{jet}}$	<code>\ghostrho</code>	$\nu_g \langle g_t \rangle$
<code>\EcaloGCWJES</code>	$E_{\text{GCW+JES}}^{\text{jet}}$	<code>\Aghost</code>	$A_g$
<code>\RcaloGCWJES</code>	$\mathcal{R}_{\text{GCW+JES}}^{\text{jet}}$	<code>\Amu</code>	$A_\mu$
<code>\EcaloLCWJES</code>	$E_{\text{LCW+JES}}^{\text{jet}}$	<code>\Amui</code>	$A_{\mu,i}$
<code>\RcaloLCWJES</code>	$\mathcal{R}_{\text{LCW+JES}}^{\text{jet}}$	<code>\jetarea</code>	$A^{\text{jet}}$
<code>\Rtrack</code>	$\mathcal{R}_{\text{track jet}}$	<code>\jetareafm</code>	$A_\mu^{\text{jet}}$
<code>\rtrk</code>	$r_{\text{trk}}$	<code>\jetareai</code>	$A_i^{\text{jet}}$
<code>\Rtrk</code>	$R_{\text{trk}}$	<code>\Rkt</code>	$R_{k_t}$
<code>\rtrackjet</code>	$r_{\text{calo / track jet}}$	<code>\pTmuslope</code>	$\partial \langle \Delta p_T \rangle / \partial \langle \mu \rangle$
<code>\rtrackjetiso</code>	$r_{\text{iso calo / track jet}}$	<code>\ptmuslope</code>	$\partial \langle \Delta p_T \rangle / \partial \langle \mu \rangle$
<code>\rtrackjetnoniso</code>	$r_{\text{non-iso calo / track jet}}$	<code>\pTnpvslope</code>	$\partial \langle \Delta p_T \rangle / \partial N_{\text{PV}}$
<code>\rtrackjetisoratio</code>	$r_{\text{non-iso/non-iso}}$	<code>\ptnpvslope</code>	$\partial \langle \Delta p_T \rangle / \partial N_{\text{PV}}$
<code>\gammajet</code>	$\gamma + \text{jet}$	<code>\pTmuunc</code>	$\Delta (\partial \langle \Delta p_T \rangle / \partial \langle \mu \rangle)$
<code>\deltaphijetgamma</code>	$\Delta \phi_{\text{jet}-\gamma}$	<code>\ptmuunc</code>	$\Delta (\partial \langle \Delta p_T \rangle / \partial \langle \mu \rangle)$
<code>\rapjet</code>	$y$	<code>\pTnpvunc</code>	$\Delta (\partial \langle \Delta p_T \rangle / \partial N_{\text{PV}})$
<code>\etajet</code>	$\eta$	<code>\ptnpvunc</code>	$\Delta (\partial \langle \Delta p_T \rangle / \partial N_{\text{PV}})$
<code>\phijet</code>	$\phi$	<code>\sumPt</code>	$\sum \vec{p}_T$
<code>\etadet</code>	$\eta_{\text{det}}$	<code>\sumpt</code>	$\sum \vec{p}_T$
<code>\etatrck</code>	$\eta_{\text{track}}$	<code>\sumptTrk</code>	$\sum p_T^{\text{track}}$
<code>\Rmin</code>	$R_{\text{min}}$	<code>\sumpttrk</code>	$\sum p_T^{\text{track}}$
<code>\DeltaR</code>	$\Delta R$	<code>\nPUtrk</code>	$n_{\text{trk}}^{\text{PU}}$
<code>\DetaDphi</code>	$\sqrt{(\Delta \eta)^2 + (\Delta \phi)^2}$	<code>\mjet</code>	$m^{\text{jet}}$
<code>\Deta</code>	$ \Delta \eta $	<code>\mlead</code>	$m_1^{\text{jet}}$
<code>\Drap</code>	$ \Delta y $	<code>\mleadavg</code>	$\langle m_1^{\text{jet}} \rangle$
<code>\DetaOneTwo</code>	$ \Delta \eta(\text{jet1}, \text{jet2}) $	<code>\Mjet</code>	$m^{\text{jet}}$
<code>\DyDphi</code>	$\sqrt{(\Delta y)^2 + (\Delta \phi)^2}$	<code>\massjet</code>	$m^{\text{jet}}$
<code>\DeltaRdef</code>	$\Delta R = \sqrt{(\Delta \eta)^2 + (\Delta \phi)^2}$	<code>\masscorr</code>	$m^{\text{corr}}$
<code>\DeltaRydef</code>	$\Delta R = \sqrt{(\Delta y)^2 + (\Delta \phi)^2}$	<code>\mthresh</code>	$M_{\text{threshold}}$
<code>\DeltaRtrk</code>	$\Delta R(\text{trk}_1, \text{trk}_2)$	<code>\mjetavg</code>	$\langle m^{\text{jet}} \rangle$
<code>\JVF</code>	JVF	<code>\masstrkjet</code>	$m^{\text{track jet}}$
<code>\cJVF</code>	corrJVF	<code>\width</code>	$w$

<code>\wcalo</code>	$w^{\text{calo}}$
<code>\wtrk</code>	$w^{\text{track}}$
<code>\shapeV</code>	$\mathcal{V}$
<code>\pTsubjct</code>	$p_{\text{T}}^{\text{subjct}}$
<code>\ptsubjct</code>	$p_{\text{T}}^{\text{subjct}}$
<code>\sjone</code>	$j_1$
<code>\sjtwo</code>	$j_2$
<code>\msubjone</code>	$m^{j_1}$
<code>\msubjtwo</code>	$m^{j_2}$
<code>\pTsubji</code>	$p_{\text{T}}^i$
<code>\ptsubji</code>	$p_{\text{T}}^i$
<code>\pTsubjone</code>	$p_{\text{T}}^{j_1}$
<code>\ptsubjone</code>	$p_{\text{T}}^{j_1}$
<code>\pTsubjtwo</code>	$p_{\text{T}}^{j_2}$
<code>\ptsubjtwo</code>	$p_{\text{T}}^{j_2}$
<code>\Rsubjets</code>	$R_{j_1, j_2}$
<code>\DRsubjets</code>	$\Delta R_{j_1, j_2}$
<code>\yij</code>	$y_{ij}$
<code>\dcut</code>	$d_{\text{cut}}$
<code>\dmin</code>	$d_{\text{min}}$
<code>\dij</code>	$d_{ij}$
<code>\Dij</code>	$\sqrt{d_{ij}}$
<code>\Donetwo</code>	$\sqrt{d_{12}}$
<code>\Dtwothr</code>	$\sqrt{d_{23}}$
<code>\yonetwo</code>	$y_1$
<code>\ytwothr</code>	$y_2$
<code>\yonetwoDef</code>	$y_1 = \sqrt{d_{12}}/m^{\text{jet}}$
<code>\ytwothrDef</code>	$y_2 = \sqrt{d_{23}}/m^{\text{jet}}$
<code>\xj</code>	$x_J$
<code>\jetFunc</code>	$J^{(eik),c}(m^{\text{jet}}, p_{\text{T}}, R)$
<code>\tauone</code>	$\tau_1$
<code>\tautwo</code>	$\tau_2$
<code>\tauthr</code>	$\tau_3$
<code>\tauN</code>	$\tau_N$
<code>\tautwoone</code>	$\tau_{21}$
<code>\tauthrtwo</code>	$\tau_{32}$
<code>\dip</code>	$\mathcal{D}$
<code>\diponetwo</code>	$\mathcal{D}_{12}$

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

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`  $\nabla$

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`  $1/p_T - 1/E_T$   
`\etptsig`  $(1/p_T - 1/E_T)/(\sigma(1/p_T))$   
`\begL`  $10^{31} \text{ cm}^{-2} \text{ s}^{-1}$   
`\lowL`  $10^{33} \text{ cm}^{-2} \text{ s}^{-1}$   
`\highL`  $10^{34} \text{ cm}^{-2} \text{ s}^{-1}$   
`\Epsb`  $\epsilon_b$   
`\Epse`  $\epsilon_c$   
`\Mtau`  $m_\tau$   
`\swsq`  $\sin^2 \theta_W$   
`\swel`  $\sin^2 \theta_{\text{eff}}^{\text{lept}}$   
`\swsqb`  $\sin^2 \theta_W$   
`\swsqon`  $\sin^2 \theta_W \equiv 1 - m_W^2/m_Z^2$   
`\gv`  $g_V$   
`\ga`  $g_A$   
`\gvbar`  $\bar{g}_V$   
`\gabbar`  $\bar{g}_A$   
`\Zzv`  $Z^*$   
`\Abb`  $A_{b\bar{b}}$   
`\Acc`  $A_{c\bar{c}}$   
`\Aqq`  $A_{q\bar{q}}$   
`\Afb`  $A_{\text{FB}}$   
`\GZ`  $\Gamma_Z$   
`\GW`  $\Gamma_W$   
`\GH`  $\Gamma_H$   
`\GamHad`  $\Gamma_{\text{had}}$   
`\Gbb`  $\Gamma_{b\bar{b}}$   
`\Rbb`  $R_{b\bar{b}}$   
`\Gcc`  $\Gamma_{c\bar{c}}$   
`\Gvis`  $\Gamma_{\text{vis}}$   
`\Ginv`  $\Gamma_{\text{inv}}$



## 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.

<code>\btol</code>	$b \rightarrow \ell$
<code>\ctol</code>	$c \rightarrow \ell$
<code>\btoc tol</code>	$b \rightarrow c \rightarrow \ell$
<code>\Jee</code>	$J/\psi \rightarrow e^+e^-$
<code>\Jmm</code>	$J/\psi \rightarrow \mu^+\mu^-$
<code>\Jmumu</code>	$J/\psi \rightarrow \mu^+\mu^-$
<code>\Wjj</code>	$W \rightarrow jj$
<code>\tjjb</code>	$t \rightarrow jjb$
<code>\Hbb</code>	$H \rightarrow b\bar{b}$
<code>\Hgg</code>	$H \rightarrow \gamma\gamma$
<code>\Hll</code>	$H \rightarrow \ell\ell$
<code>\Hllll</code>	$H \rightarrow \ell\ell\ell\ell$
<code>\Hmmmm</code>	$H \rightarrow \mu\mu\mu\mu$
<code>\Heeee</code>	$H \rightarrow eeee$
<code>\Zll</code>	$Z \rightarrow \ell\ell$
<code>\Zlplm</code>	$Z \rightarrow \ell^+\ell^-$
<code>\Zee</code>	$Z \rightarrow ee$
<code>\Zepem</code>	$Z \rightarrow e^+e^-$
<code>\Zmm</code>	$Z \rightarrow \mu\mu$
<code>\Zmpmm</code>	$Z \rightarrow \mu^+\mu^-$
<code>\Ztt</code>	$Z \rightarrow \tau\tau$
<code>\Ztptm</code>	$Z \rightarrow \tau^+\tau^-$
<code>\Zbb</code>	$Z \rightarrow b\bar{b}$
<code>\Wln</code>	$W \rightarrow \ell\nu$
<code>\Wen</code>	$W \rightarrow e\nu$
<code>\Wmn</code>	$W \rightarrow \mu\nu$
<code>\Wlnu</code>	$W \rightarrow \ell\nu$
<code>\Wenu</code>	$W \rightarrow e\nu$

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

## 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`.

<code>\AntiktSnippet</code>	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-clusters as inputs. Jet energy is calibrated to the hadronic scale with the effect of pile-up removed.
<code>\TopoclusteringSnippet</code>	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-clusters are 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 <i>local cluster weighting</i> , or LCW, and jets that are calibrated using this procedure are referred to as LCW jets [2].
<code>\GroomingSnippet</code>	Trimming removes subjects with $p_T^i/p_T^{\text{jet}} < f_{\text{cut}}$ , where $p_T^i$ is the transverse momentum of the $i^{\text{th}}$ subject, and $f_{\text{cut}} = 0.05$ . Filtering proceeds similarly, but utilises the relative masses of the subjects 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.
<code>\FastSimSnippet</code>	The signal Monte Carlo samples were processed with a fast simulation that relies on a parameterisation of the calorimeter response [3].
<code>\PileupSnippet</code>	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`.

<code>\TeV</code>	TeV
<code>\GeV</code>	GeV
<code>\MeV</code>	MeV
<code>\keV</code>	keV
<code>\eV</code>	eV
<code>\TeVc</code>	TeV/c
<code>\GeVc</code>	GeV/c
<code>\MeVc</code>	MeV/c
<code>\keVc</code>	keV/c
<code>\eVc</code>	eV/c
<code>\TeVcc</code>	TeV/c <sup>2</sup>
<code>\GeVcc</code>	GeV/c <sup>2</sup>
<code>\MeVcc</code>	MeV/c <sup>2</sup>
<code>\keVcc</code>	keV/c <sup>2</sup>
<code>\eVcc</code>	eV/c <sup>2</sup>
<code>\ifb</code>	fb <sup>-1</sup>
<code>\ipb</code>	pb <sup>-1</sup>
<code>\inb</code>	nb <sup>-1</sup>
<code>\degr</code>	°

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`:

<code>\si{\TeV}</code>	TeV
<code>\si{\GeV}</code>	GeV
<code>\si{\MeV}</code>	MeV
<code>\si{\keV}</code>	keV
<code>\si{\eV}</code>	eV
<code>\si{\TeVc}</code>	TeV/c
<code>\si{\GeVc}</code>	GeV/c
<code>\si{\MeVc}</code>	MeV/c
<code>\si{\keVc}</code>	keV/c

<code>\si{\eVc}</code>	eV/c
<code>\si{\TeVcc}</code>	TeV/c <sup>2</sup>
<code>\si{\GeVcc}</code>	GeV/c <sup>2</sup>
<code>\si{\MeVcc}</code>	MeV/c <sup>2</sup>
<code>\si{\keVcc}</code>	keV/c <sup>2</sup>
<code>\si{\eVcc}</code>	eV/c <sup>2</sup>
<code>\si{\nb}</code>	nb
<code>\si{\pb}</code>	pb
<code>\si{\fb}</code>	fb
<code>\si{\per\fb}</code>	fb <sup>-1</sup>
<code>\si{\per\pb}</code>	pb <sup>-1</sup>
<code>\si{\per\nb}</code>	nb <sup>-1</sup>
<code>\si{\ifb}</code>	fb <sup>-1</sup>
<code>\si{\ipb}</code>	pb <sup>-1</sup>
<code>\si{\inb}</code>	nb <sup>-1</sup>
<code>\si{\Hz}</code>	Hz
<code>\si{\kHz}</code>	kHz
<code>\si{\MHz}</code>	MHz
<code>\si{\GHz}</code>	GHz
<code>\si{\degr}</code>	°
<code>\si{\m}</code>	m
<code>\si{\cm}</code>	cm
<code>\si{\mm}</code>	mm
<code>\si{\um}</code>	μm
<code>\si{\micron}</code>	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`, `\POWPTHIA`. 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:  $\pi$ ,  $\eta$  and  $\psi$  to be used directly in text mode. In addition, the primed  $\Upsilon$  resonances, e.g.  $\Upsilon''$ , 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  $\Upsilon$  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  $E_T^{\text{miss}}$ . However, with the latest version of the packages both forms work fine. You can compare  $E_T^{\text{miss}}$  and  $E_T^{\text{miss}}$  and see that the spacing is correct in both cases.

## References

- [1] A. Buckley, *The hepparticles package for L<sup>A</sup>T<sub>E</sub>X*,  
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 \[physics.ins-det\]](#).