ATLAS NOTE

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Symbols defined in `atlasphysics.sty`

Ian C. Brock

University of Bonn

Abstract

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 01-05-00 of the ATLAS LaTeX package.

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{latex/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;

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;

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

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

xref (true) Useful abbreviations for cross-references.

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

There is an additional option texmf. If this option is included, the subfiles are included using the command: `\RequirePackage{atlaspartcle}` etc. instead of `\RequirePackage{latex/atlaspartcle}`. 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'.

See Section 12 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!

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.

\tbar	$\bar{t}$
\ttbar	$t\bar{t}$
\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	$\ell^+\ell^-$
\lnu	$\ell\nu$
\Zzero	Z
\Zboson	Z
\Wplus	W^+
\Wminus	W^-
\Wboson	W
\Wpm	$W^\pm$
\Wmp	$W^\mp$

\pi	π
\pizero	π^0
\piplus	π^+
\piminus	π^-
\pipm	$\pi^\pm$
\pimp	$\pi^\mp$
\eta	η
\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^*
\psi	ψ
\jpsi	J/ψ
\Jpsi	J/ψ
\psip	ψ'
\Upsp	Υ'
\Upspp	Υ''
\Upsppp	Υ'''
\Upspppp	Υ''''
\UoneS	$\Upsilon(1\mathrm{S})$
\Dstar	D^*
\Dsstar	D^{**}
\Bd	B^0_d
\Bs	B^0_s
\Bu	B_u
\Bc	B_c
\Lb	Λ_b
\Bstar	B^*
\chic	χ_c

`\BoBo`	B^0–$\bar{B}^0$
`\BodBod`	B^0_d–$\bar{B}^0_d$
`\BosBos`	B^0_s–$\bar{B}^0_s$
`\chib`	χ_b

A generic macro `\Ups[1]` is available. It is defined such that `\Ups{3}` produces $\Upsilon(3S)$.

3 `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.
`\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.
`\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.
`\EPJ`	Eur. Phys. J.
`\EPJC`	Eur. Phys. J. C
`\collab`	Collaboration

4 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_{truth}
\PjetTru	p_{truth}
\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	$z_0 \sin(\theta)$
\mh	m_h
\mW	m_W
\mZ	m_Z
\mH	m_H
\ALPGEN	Alpgen
\GEANT	Geant
\HERWIG	Herwig
\JIMMY	Jimmy
\METOP	MEtop
\POWHEG	Powheg
\PROTOS	Protos
\PYTHIA	Pythia
\SHERPA	Sherpa
\ra	$\rightarrow$
\la	$\leftarrow$
\rarrow	$\rightarrow$
\larrow	$\leftarrow$
\lapprox	$\lesssim$
\rapprox	$\gtrsim$
\gam	γ
\stat	(stat.)
\syst	(syst.)
\alphas	α_{S}
\NF	N_{F}
\NC	N_{C}
\CF	C_{F}
\CA	C_{A}
\TF	T_{F}
\Lms	$\Lambda_{\overline{\mathrm{MS}}}$
\Lmsfive	$\Lambda_{\overline{\mathrm{MS}}}^{(5)}$
\KT	$k_{\perp}$
\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 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

$$a \to b + c$$
$$\quad |\!\!\longrightarrow \; e + f$$
$$\qquad\quad |\!\!\longrightarrow \; g + h$$

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

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

5 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:

`\Eqn{1}`	Eq. 1
`\Fig{1}`	Fig. 1
`\Ref{1}`	Ref. 1
`\Sect{1}`	Sect. 1
`\Tab{1}`	Table 1
`\Eqns{1}{4}`	Eqs. 1–4
`\Figs{1}{4}`	Figs. 1–4
`\Refs{1}{4}`	Refs. 1–4
`\Sects{1}{4}`	Sects. 1–4
`\Tabs{}1}{4}`	Tables 1–4

6 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`	$\tilde{\nu}$

7 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
\pp	pp
\pn	pn
\np	np
\PbPb	Pb+Pb
\AuAu	Au+Au
\CuCu	Cu+Cu
\pA	p+A
\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	$R_{p\text{Pb}}$
\dif	d
\dNchdeta	$\mathrm{d}N_{\text{ch}}/\mathrm{d}\eta$
\dNevtdET	$\mathrm{d}N_{\text{evt}}/\mathrm{d}E_{\text{T}}$
\ystar	y^{*}
\ycms	y_{CM}
\ygappb	$\Delta\eta_{\text{gap}}^{\text{Pb}}$
\ygapp	$\Delta\eta_{\text{gap}}^{p}$
\fgap	f_{gap}

8 atlasmath.sty

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

\boxsq	$\Box^2$
\grad	$\boldsymbol{\nabla}$

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

9 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
\mA	m_A
\Mtau	m_τ
\swsq	$\sin^2\theta_W$
\swel	$\sin^2\theta_{\mathrm{eff}}^{\mathrm{lept}}$
\swsqb	$\sin^2\overline{\theta}_W$
\swsqon	$\sin^2\theta_W \equiv 1 - m_W^2/m_Z^2$
\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}

10 atlasprocess.sty

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

\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	$H \to ZZ^{(*)} \to \mu\mu\mu\mu$
\Hmmmm	$H \to \mu\mu\mu\mu$
\Heeee	$H \to eeee$
\Zmm	$Z \to \mu\mu$
\Zee	$Z \to ee$
\Zll	$Z \to \ell\ell$
\Wln	$W \to \ell\nu$
\Wen	$W \to e\nu$
\Wmn	$W \to \mu\nu$
\Amm	$A \to \mu\mu$
\Ztautau	$Z \to \tau\tau$
\Wtaunu	$W \to \tau\nu$
\Atautau	$A \to \tau\tau$
\Htautau	$H \to \tau\tau$
\Brjl	$\mathrm{Br}(J/\psi \to \ell^+\ell^-)$

11 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
\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.

12 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.