ATLAS NOTE

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Symbols defined in `atlasphysics.sty`

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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 00-98-00 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. It 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|nobs, (off) BSM and SUSY particles;

math|nomath (off) A few extra maths definitions;

misc|nomisc (on) Miscellaneous definitions that are often used;

other|noother (off) Definitions that used to be in `atlasphysics.sty`, but are probably too specialised to be needed by most people;

particle|noparticle (on) Standard Model particles and some combinations;

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

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

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 Appendix 9 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 and off with the option noparticle.

`\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`	$\Upsilon(1S)$
`\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 defined so that `\Ups{3}` produces $\Upsilon(3S)$.

3 `atlasmisc.sty`

Turn on including these definitions with the option math and off with the option nomath.

\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	$E_{\mathrm{T}}^{\mathrm{miss}}$
\EjetRec	E_{rec}
\PjetRec	p_{rec}
\EjetTru	E_{truth}
\PjetTru	p_{truth}
\EjetDM	E_{DM}
\Rcone	R_{cone}
\abseta	$|\eta|$
\Ecm	E_{cm}
\mh	m_h
\mW	m_W
\mZ	m_Z
\mH	m_H
\mA	m_A
\ra	$\rightarrow$
\la	$\leftarrow$
\rarrow	$\rightarrow$
\larrow	$\leftarrow$
\lapprox	$\lesssim$
\rapprox	$\gtrsim$
\gam	γ
\rts	$\sqrt{s}$
\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	$|V_{cb}|$
\Vub	$|V_{ub}|$
\Vtd	$|V_{td}|$
\Vts	$|V_{ts}|$
\Vtb	$|V_{tb}|$
\Vcs	$|V_{cs}|$
\Vud	$|V_{ud}|$
\Vus	$|V_{us}|$
\Vcd	$|V_{cd}|$

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

$$
\eqalign{a \to & b+c\\
 & \dk & e+f \\
 && \dk g+h}
$$

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

4 `atlasbsm.sty`

Turn on including these definitions with the option bsm and off with the option nobsm.

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	$\tilde{q}_L$
\squarkR	$\tilde{q}_R$

\gluino	$\tilde{g}$
\stop	$\tilde{t}$
\stopone	$\tilde{t}_1$
\stoptwo	$\tilde{t}_2$
\stopL	$\tilde{t}_L$
\stopR	$\tilde{t}_R$
\sbottom	$\tilde{b}$
\sbottomone	$\tilde{b}_1$
\sbottomtwo	$\tilde{b}_2$
\sbottomL	$\tilde{b}_L$
\sbottomR	$\tilde{b}_R$
\slepton	$\tilde{\ell}$
\sleptonL	$\tilde{\ell}_L$
\sleptonR	$\tilde{\ell}_R$
\sel	$\tilde{e}$
\selL	$\tilde{e}_L$
\selR	$\tilde{e}_R$
\smu	$\tilde{\mu}$
\smuL	$\tilde{\mu}_L$
\smuR	$\tilde{\mu}_R$
\stau	$\tilde{\tau}$
\stauL	$\tilde{\tau}_L$
\stauR	$\tilde{\tau}_R$
\stauone	$\tilde{\tau}_1$
\stautwo	$\tilde{\tau}_2$
\snu	$\tilde{\nu}$

5 `atlasunit.sty`

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

\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	°

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 altern-
ative is `hepunits`. If either of these packages are
used `atlasunit.sty` is not needed.

6 `atlasmath.sty`

Turn on including these definitions with the option
math and off with the option nomath.

\boxsq	$\Box^2$
\grad	∇

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

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

7 `atlasother.sty`

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

`\etpt`	$1/p_T - 1/E_T$
`\etptsig`	$(1/p_T - 1/E_T)/(\sigma(1/p_T))$
`\begL`	$10^{31}\,\mathrm{cm^{-2}\,s^{-1}}$
`\lowL`	$10^{33}\,\mathrm{cm^{-2}\,s^{-1}}$
`\highL`	$10^{34}\,\mathrm{cm^{-2}\,s^{-1}}$
`\Epsb`	ϵ_b
`\Epsc`	ϵ_c
`\Mtau`	m_τ
`\swsq`	$\sin^2\theta_W$
`\swel`	$\sin^2\theta_{\mathrm{eff}}^{\mathrm{lept}}$
`\swsqb`	$\sin^2\bar{\theta}_W$
`\swsqon`	$\sin^2\theta_W \equiv 1 - m_W^2/m_Z^2$
`\gv`	g_V
`\ga`	g_A
`\gvbar`	$\bar{g}_V$
`\gabar`	$\bar{g}_A$
`\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}

8 `atlasprocess.sty`

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

`\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`	$\mathrm{Br}(J/\psi \to \ell^+\ell^-)$

9 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.

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` dis 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.