

Table of Contents

Status Codes for Top MC Generators.....	1
Pythia 6.....	1
Pythia 8.....	1
Herwig.....	1
Herwig++.....	2

Status Codes for Top MC Generators

Status code information for the various generators used in top analyses is hard to find; the following explain how status codes are assigned for Pythia and Herwig generators

Pythia 6

- `status 1`: Stable final-state particle
 - `status 2`: Unstable particle
 - `status 10902`: Exactly the same as `status 2` above
 - `status 3`: Documentary particle; Often a process generated outside pythia, then passed to it for showering
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Pythia 8

- Negative vs. Positive: A particle which decays is given a negative status; the final state only consists of positive-status particles
 - `status 1`: Final-state particle
 - `status 11-19`: Beam particles
 - `status 21-29`: Particles from the hardest subprocess
 - `status 31-39`: Particles from subsequent subprocesses in multiple interactions
 - `status 41-49`: Particles produced by initial-state showers (ISR, or generally particles not from the final state of the hard process)
 - `status 51-59`: Particles produced by final-state showers
 - `status 61-69`: Particles produced by beam-remnant treatment
 - `status 71-79`: Particles about to be hadronized (input partons to a hadron)
 - `status 81-89`: Primary output of hadronization process (first level of hadrons)
 - `status 91-99`: Particles produced in final decay process, or by Bose-Einstein effects (?)
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Herwig

Unhighlighted statuses from 153-165 may have somewhat different uses than those available

- `status 1`: final state particle
- `status 2`: parton before hadronization
- `status 3`: documentation line
- `status 100`: cone limiting jet evolution
- `status 101`: `beam' (beam 1)
- `status 102`: `target' (beam 2)
- `status 103`: overall centre of mass
- `status 110`: unprocessed hard process c.m.
- `status 111`: unprocessed beam parton
- `status 112`: unprocessed target parton
- `status 113`: unproc. first outgoing parton
- `status 114`: unproc. other outgoing parton
- `status 115`: unprocessed spectator parton
- `status 120-25`: as 110-15, after processing
- `status 130`: lepton in jet (unboosted)
- `status 131-34`: as 141-44, unboosted to c.m.

- status 135: spacelike parton (beam, unboosted)
- status 136: spacelike parton (target,unboosted)
- status 137: spectator (beam, unboosted)
- status 138: spectator (target, unboosted)
- status 139: parton from branching (unboosted)
- status 140: parton from gluon splitting (unboosted)
- status 141-44: jet from parton type 111-14
- status 145-50: as 135-40 boosted, unclustered
- status 151: as 159, not yet clustered
- status 152: as 160, not yet clustered
- status 153: spectator from beam
- status 154: spectator from target
- status 155: **unstable fundamental particle before decay**
- status 156: spectator before heavy decay
- status 157: parton from QCD branching
- status 158: parton from gluon splitting
- status 159: parton from cluster splitting
- status 160: spectator after heavy decay
- status 161: beam spectator after gluon splitting
- status 162: target spectator after gluon splitting
- status 163: other cluster before soft process
- status 164: beam cluster before soft process
- status 165: target cluster before soft process
- status 167: unhadronized beam cluster
- status 168: unhadronized target cluster
- status 170: soft process centre of mass
- status 171: soft cluster (beam, unhadronized)
- status 172: soft cluster (target, unhadronized)
- status 173: soft cluster (other, unhadronized)
- status 181: beam cluster (no soft process)
- status 182: target cluster (no soft process)
- status 183: hard process cluster (hadronized)
- status 184: soft cluster (beam, hadronized)
- status 185: soft cluster (target, hadronized)
- status 186: soft cluster (other, hadronized)
- status 190-93: as 195-98, before decays
- status 195: direct unstable non-hadron
- status 196: direct unstable hadron (1-body clus.)
- status 197: direct unstable hadron (2-body clus.)
- status 198: indirect unstable hadron or lepton
- status 199: decayed heavy flavour hadron
- status 200: neutral B meson, flavour at production

Herwig++

Current status code scheme seems to be temporary, will likely change in the future. Statuses 0, 3, and 12-200 are not currently in use; all particles not labelled 1, 2, or 4 are labelled 11.

- status 0: an empty entry, with no meaningful information and therefore to be skipped unconditionally
- status 1: a final-state particle, i.e. a particle that is not decayed further by the generator (may also include unstable particles that are to be decayed later, as part of the detector simulation). Such particles must always be labelled '1'.

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- `status 2`: a decayed Standard Model hadron or tau or mu lepton, excepting virtual intermediate states thereof (i.e. the particle must undergo a normal decay, not e.g. a shower branching). Such articles must always be labelled '2'. No other particles can be labelled '2'.
- `status 3`: a documentation entry
- `status 4`: an incoming beam particle
- `status 11-200`: an intermediate (decayed/branched/...) particle that does not fulfill the criteria of status code 2, with a generator-dependent classification of its nature

-- KevinSapp - 02-Feb-2011

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