

ROOT DST Data Format

ROOT DST Files

Overview

The ROOT DST files are generated from the LCIO output of the reconstruction. These files can be analyzed using the HpsEvent API in combination with the ROOT data analysis framework.

The *hps-dst* project provides the DST Maker used to perform this conversion from LCIO to ROOT and also includes the HpsEvent API implementation.

Software Resources

Here are some useful links related to the DST software.

- [DST Maker Installation Instructions](#)
- [HPS DST Project Homepage on github](#)
- [HPS DST Issue Tracker](#)

DST Event Structure

The ROOT based DST's are composed of HpsEvent objects which are used to encapsulate collections (TClonesArray) of physics objects e.g. tracks and particles. The collections encapsulated by an HpsEvent are shown on Table 1.

Collection Name (TClonesArray)	Type	Variables (ROOT leaves)	References (TRefArray)
tracks	SvtTrack	# hits, d0, phi, omega, tan_lambda, z0, chi^2	SvtHit
svt_hits	SvtHit	layer #, corrected position and covariance matrix, hit time	
ecal_clusters	EcalCluster	# ecal hits, position, energy, hit time, m2, m3	EcalHit, SeedHit
ecal_hits	EcalHit	position, crystal indices, energy	
fs_particles (Final State Particles)	HpsParticle	charge, momentum, energy	SvtTrack, EcalCluster
uc_vtx_particles (Unconstrained Vertexed Particles)	HpsParticle	# daughters, charge, fitted momentum, energy, vertex position	HpsParticle
bsc_vtx_particles (Beamspot Vertexed Particles)	HpsParticle	# daughters, charge, fitted momentum, energy, vertex position	HpsParticle
tc_vtx_particles (Target Constrained Vertexed Particles)	HpsParticle	# daughters, charge, fitted momentum, energy, vertex position	HpsParticle
mc_particles	HpsMCParticle	pdg id, charge, generator status, energy, mass, momentum, endpoint	
gbl_tracks	GblTrack	kappa, theta, phi, d0, z0, seed_kappa, seed_theta, seed_phi, seed_d0, seed_z0, chi^2, ndf, momentum, covariance	
gbl_tracks_data	GblTrackData	# of strip hits, kappa, theta, phi, d0, z0	
gbl_strips_data	GblStripData	id, path3D, path ...	

Table 1: Collections and variables encapsulated by HpsEvent.

The HpsEvent class also contains additional event information, e.g. run number, as shown on Table 2.

ROOT Branch	Variables (ROOT leaves)
HpsEvent	event #, run #, # tracks, # SVT hits, # Ecal clusters, # Ecal hits, # final state particles, # unconstrained/beam constrained/target constrained particles, # of MC particles, # GBL tracks, # GBL track data, # GBL strips data

Table 2: Variables encapsulated by HpsEvent.