

Chapter 1

Spill data structure

spill:

- mc
 - *array item*
 - * virtual_hits: Virtual hits store information on all particles as they cross a user-defined plane in space, time or proper time
 - * tracks: Stores information on stepping information, initial and final position of the track. Enabled by 'keep_tracks' datacard
 - * hits: Stores information on interactions of particles with sensitive detectors
 - * primary: Describes the initial particle that is used as an input into the Monte Carlo simulation

spill/mc/array item/virtual_hits:

- *array item*
 - track_id: Identifier for the track that made the hit
 - path_length: Total path length travelled of the particle that made the hit [mm]
 - b_field: Magnetic field at the position and time that the hit was recorded [kT]
 - * y
 - * x
 - * z
 - e_field: Electric field at the position and time that the hit was recorded [MV/mm]
 - * y
 - * x
 - * z
 - charge: charge of the particle that made the hit [e^+ charge]

- `particle_id`: Identifies the particle type according to the PDG indexing system (<http://hepdata.cedar.ac.uk/lbl/2011/reviews/rpp2011-rev-naming-scheme-hadrons.pdf>)
- `station_id`: ID for the virtual plane that registered this hit. See Mice-Modules docs for options on how stations are numbered.
- `mass`: mass of the particle that made the hit [MeV/c²]
- `momentum`: Momentum of the track that made the hit [MeV/c]
 - * `y`
 - * `x`
 - * `z`
- `time`: particle time for the track that made the hit [ns]
- `position`: Position of the hit [mm]
 - * `y`
 - * `x`
 - * `z`
- `proper_time`: Relativistic proper time of the particle that made the hit [ns]

`spill/mc/array item/tracks`:

- `initial_momentum`: Initial momentum of the track [MeV/c]
 - `y`
 - `x`
 - `z`
- `initial_position`: Initial position of the track [mm]
 - `y`
 - `x`
 - `z`
- `particle_id`
- `steps`: Stores information on each step in the tracking. Enabled by 'keep_steps' datacard
- `parent_track_id`
- `track_id`
- `final_momentum`: Final momentum of the track [MeV/c]
 - `y`
 - `x`
 - `z`
- `final_position`: Final position of the track [mm]

- y
- x
- z

spill/mc/array *item*/hits:

spill/mc/array *item*/primary:

- position

- y
- x
- z

- energy

- particle_id

- momentum

- y
- x
- z

- time

spill/mc/array *item*/tracks/steps:

- array *item*

- energy_deposited: Energy deposited by the track on the previous step [MeV]
- path_length: Distance travelled by the particle when it made the step [mm]
- energy: Energy of the track [MeV]
- momentum: Momentum of the track that made the step [MeV/c]
 - * y
 - * x
 - * z
- time: Time of the track in lab frame when it made the step [ns]
- position: Position of the step [mm]
 - * y
 - * x
 - * z
- proper_time: Proper time of track when it made the step [ns]