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 MiceModules docs for options on how stations are numbered.
  - mass: mass of the particle that made the hit [MeV/c^2]
  - 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:

- random_seed
- energy
- particle_id
- time
- position
    - y
    - x
    - z
- momentum
    - y
    - x
    - z

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]