

Outline

- Marlin processors
- Simulation parameters
- Test robustness of simulation
- dE/dx for pions, kaons and protons
- Conclusions

- New Processors at svnserver.desy.de/svn/marlinreco/MarlinReco/trunk/Analysis/SiPID/

- SiTracker_dEdxProcessor

Calculates the value and the uncertainty of dE/dx in planar Si tracker (including VXD) for all tracks in the event and writes them with the track object in the LCI0 file.

Angle w.r.t. the normal to the tracker plane is taken into account

Geometry is taken from the layering extension of LCDD

Important: There may be only one tracker hit per single passage of track

across a tracker plane!

(Otherwise the total traversed thickness is wrongly calculated).

- AnalyseSidEdxProcessor

Reads $dEdx$ and the associated uncertainties, and a set of further parameters of the track and the associated MC particle from the LCI0 file and writes them to a root tree for analysis.

From the detector xml file:

```
<limits>
  <limitset name="cal_limits">
    <limit name="step_length_max" particles="*" value="5.0" unit="mm" />
  </limitset>
  <limitset name="SiTrackerBarrelRegionLimitSet">
    <limit name="step_length_max" particles="*" value="5.0" unit="mm" />
    <limit name="track_length_max" particles="*" value="5.0" unit="mm" />
    <limit name="time_max" particles="*" value="5.0" unit="ns" />
    <limit name="ekin_min" particles="*" value="0.01" unit="MeV" />
    <limit name="range_min" particles="*" value="5.0" unit="mm" />
  </limitset>
</limits>
<regions>
  <region name="SiTrackerBarrelRegion" eunit="MeV" lunit="mm" threshold="0.000001">
    <limitsetref name="SiTrackerBarrelRegionLimitSet"/>
  </region>
</regions>
```

Note: I have removed the "cut" parameter from the "region" entry.

=====

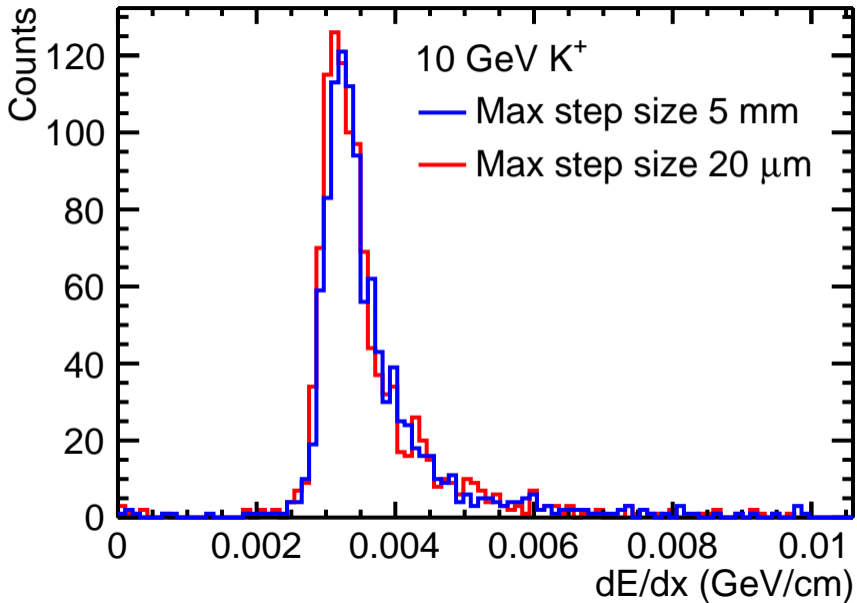
In clic_steer.py:

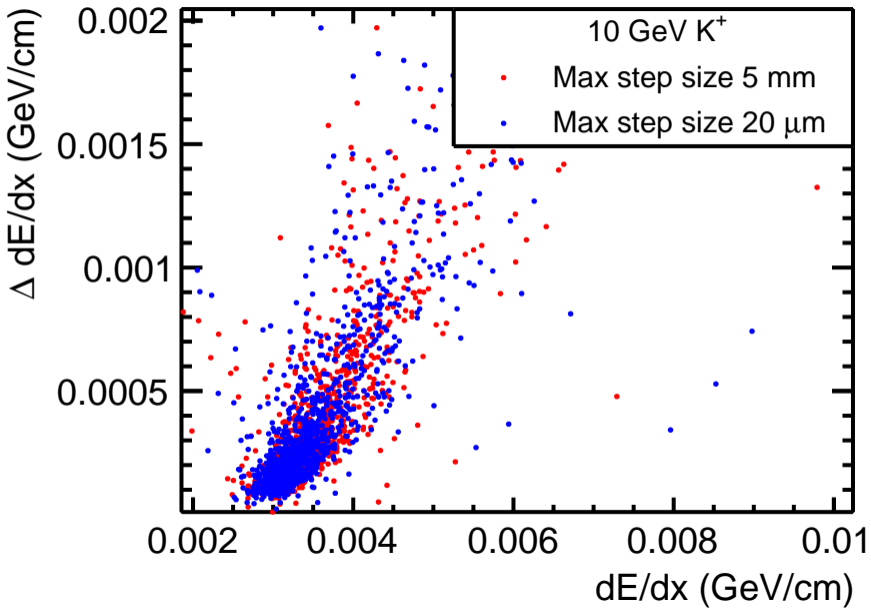
```
SIM.action.tracker = "Geant4TrackerWeightedAction"
...
SIM.physics.list = "QGSP_BERT"
```

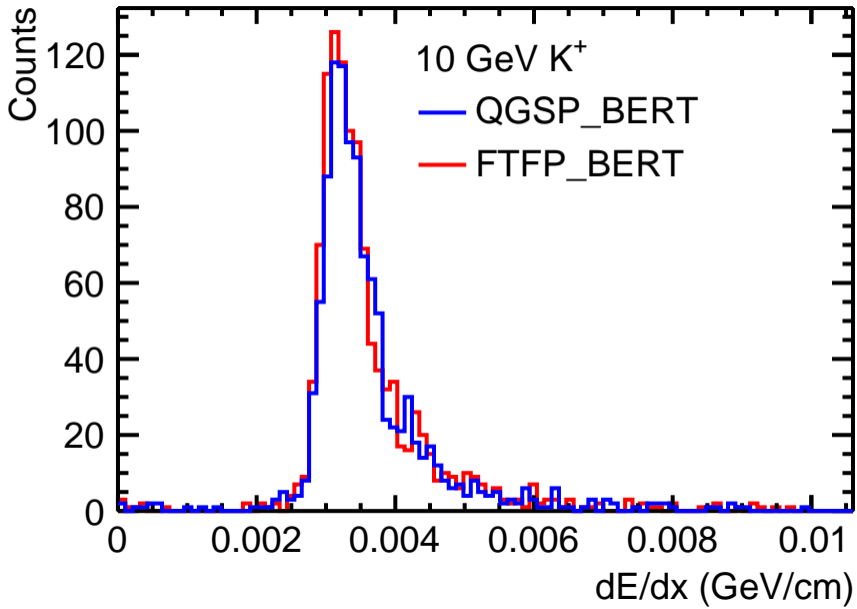
Everything else as downloaded from the repo (15. Dec. 2016)

Test robustness of the simulation:

- `step_length_max` : 5 mm (default) vs. 20 um
- Physics list: QGSP_BERT vs FTFP

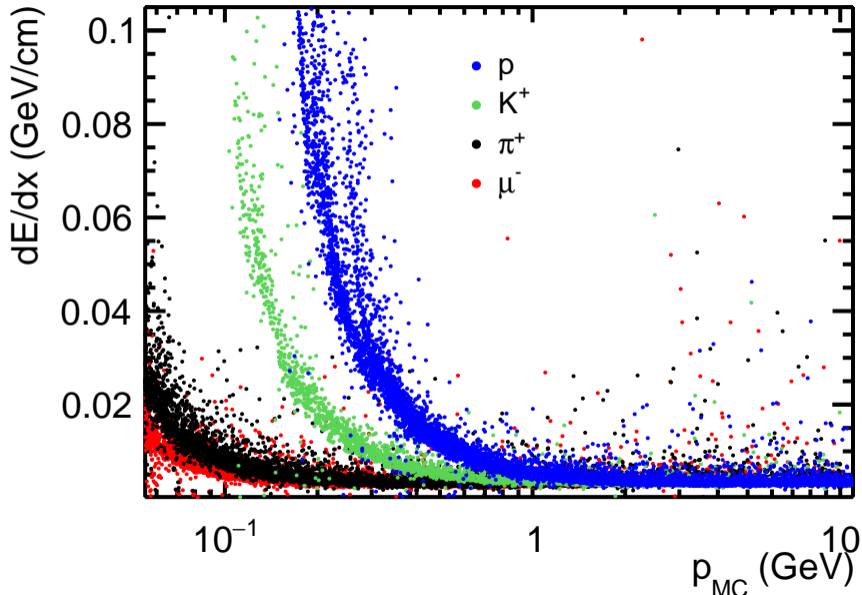




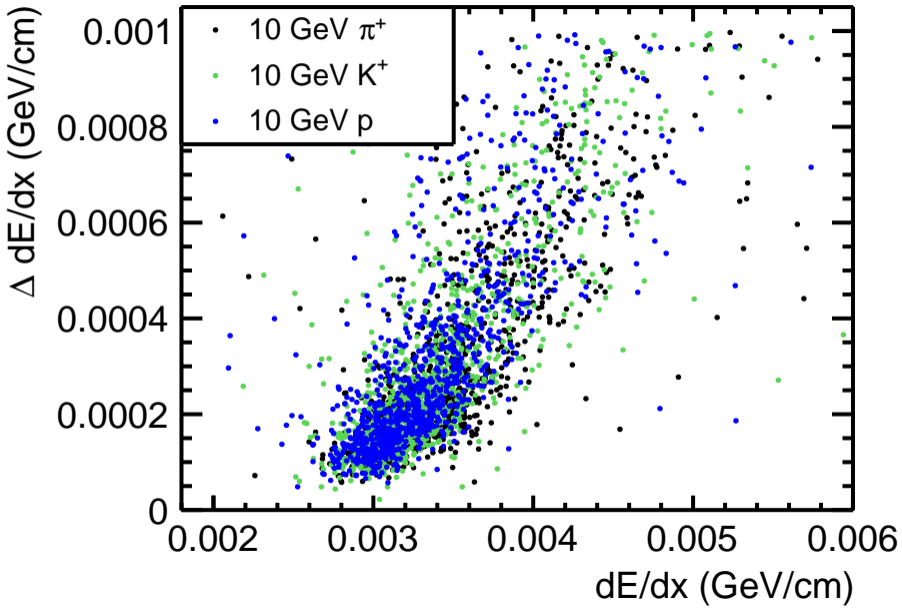


RESULTS

dE/dx vs. p_{MC}



Fixed energy, $\Delta dE/dx$ vs. dE/dx



Conclusions

- dE/dx processor for Si trackers is ready
- Preliminary simulations with the simple digitiser have been performed
- PID possible for momenta below ~ 2 GeV
- Above ~ 2 GeV, dE/dx and the uncertainty of dE/dx are not sensitive to the particle type.
Confirmed in simulations with:
 - QGSP_BERT and FTFP_BERT
 - Max step 5 mm or 20 μ m