GCRrecon and GCRselect status

- Description of algorithms and variables
- Simulations and results for C & Mg
- Conclusions

The algorithms

- 2 new algorithms and tools have been implemented in GR v9r3
- The new package is called GCRcalib
  - GCRcalib/v1r1p1/src/GCRRecon/GcrReconAlg(Tool).cxx
  - GCRcalib/v1r1p1/src/GCRSelect/GcrSelectAlg(Tool).cxx
- The algorithms can be called from the JO file:
  - ApplicationMgr.DLLs +={ "CalRecon", "CalUtil", "GCRCalib",…}
  - Cal1.Members = {"CalXtalRecAlg“, "CalClustersAlg/first", "GcrReconAlg", "GcrSelectAlg“,…}
- The new outputs are:
  - GCRRecon → in recon.root:
    - A collection of GcrXtals
    - A GcrTrack
  - GCRSelect → in gcrSelect.root (new ROOT file!):
    - A collection of GcrSelectedXtals
- For detailed information:
  - See updated UML diagram at the end of this presentation
  - Presentations at s/w core meeting next Tuesday

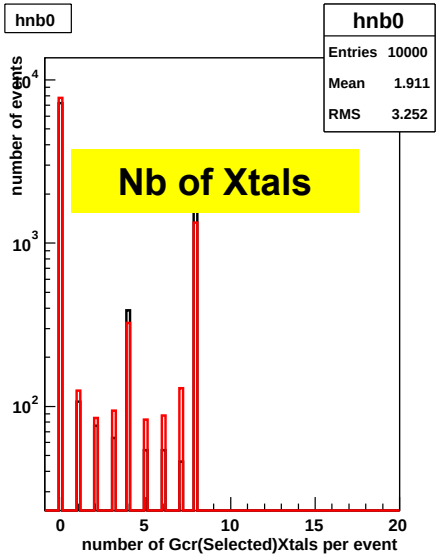
GCRRecon

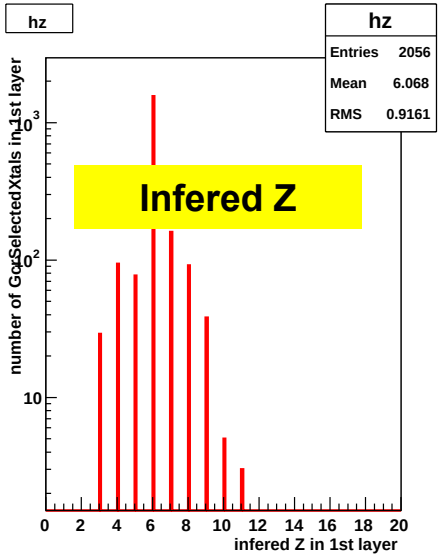
- Retrieves the following information from TDS:
  - Collection of CalXtalRecData
  - MC true direction as particle direction Dir
    - Will change as soon as TKR recon is adapted to heavy ions
- Propagates Dir into CAL
- Builds 1 GcrTrack (stored in recon.root), containing:
  - CalEntryPoint and CalExitPoint at,
  - Dir (and DirErr=0 for the moment)
- Builds a collection of GcrXtals (stored in recon.root):
  - A GcrXtal is a log crossed by Dir, with a corresponding XtalRecData, with some additional properties:
    - entry and exit points, path-length
    - distance of this segment center to the closest log face
    - crossed faces:
      - defined as an integer = 2^zTop + 2^zBot + 2^xLeft + 2^xRight + 2^yLeft + 2^yRight, where zTop,…yRight=0,...,5 → crossedFaces=3 for top/bottom

GCRSelect

- Retrieves the following information from TDS:
  - Collection of CalXtalRecData
  - Collection of GcrXtals
- Rejects interactions with a simple filtering procedure:
  - Builds "2D"-clusters (per layer):
    - A cluster is a set of adjacent hits in one layer, with >100 MeV
  - Requires 1 and only 1 cluster per layer, with at most 2 hits (multiplicity criterium)
  - Onlys keeps the first successive layers (from the top of the CAL), which fulfill the multiplicity criterium
    - Infers also Z from the energy of single cluster in layer 0
      - Not used for the moment, will be needed for study of correlation between layers (heavy ions slowing down, etc…)
- Build a collection of GcrSelectedXtals (stored in gcrSelect.root):
  - In each selected layer, extracts the logs with a corresponding GcrXtal and store them as GcrSelectedXtals
    - same properties as GcrXtals

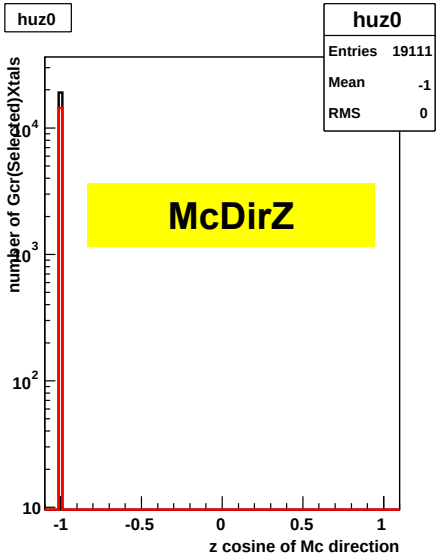
Simulations of vertical C

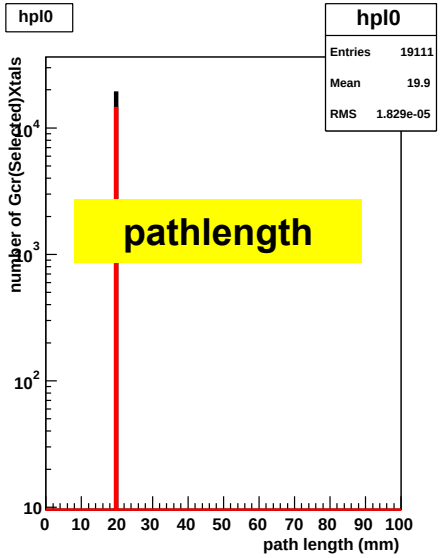




nt=10000 simulated events

nz=1559 have correct infered Z among 2056 events with 1 gcrSelectedXtal in 1st layer



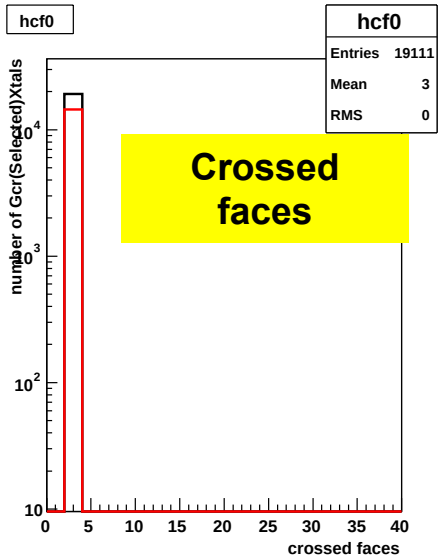


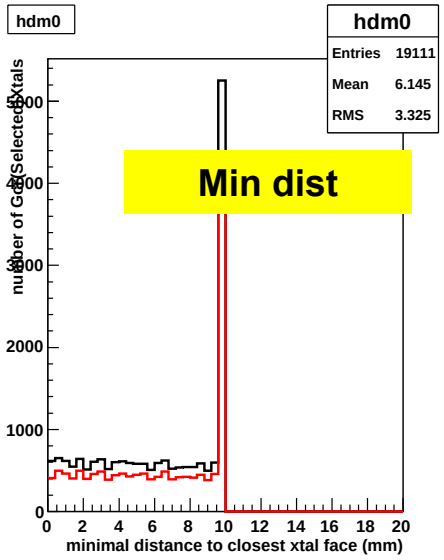
ng =nb of GcrXtals
ns = nb of GcrSelectedXtals

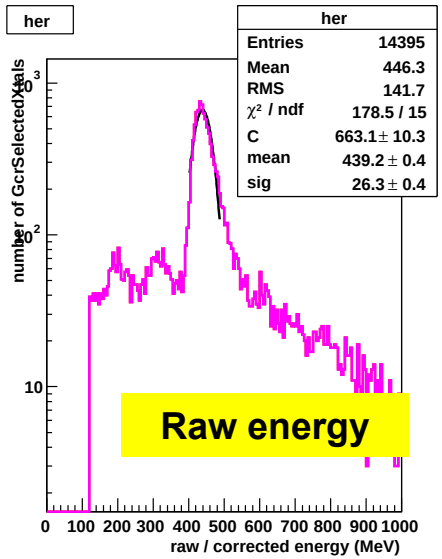
ng= 2813 ns= 2263 total

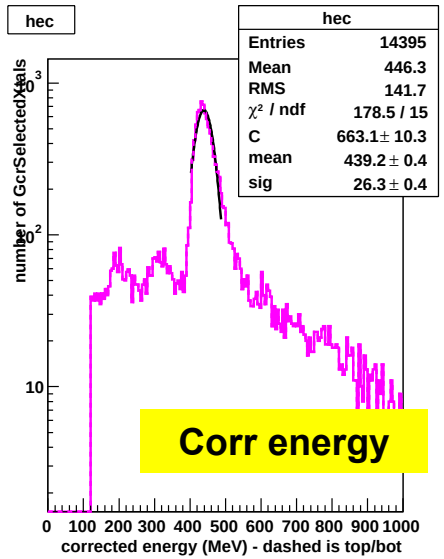
ng= 2500 ns= 2056 in layer 0
ng= 2438 ns= 1991 in layer 1
ng= 2429 ns= 1929 in layer 2
ng= 2381 ns= 1851 in layer 3
ng= 2377 ns= 1761 in layer 4
ng= 2354 ns= 1686 in layer 5
ng= 2343 ns= 1608 in layer 6
ng= 2289 ns= 1513 in layer 7

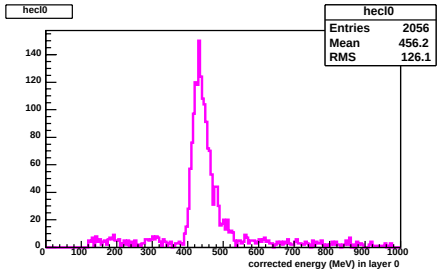
Simulations of vertical C

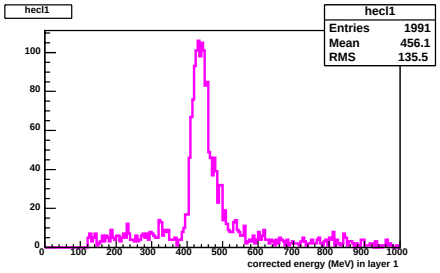


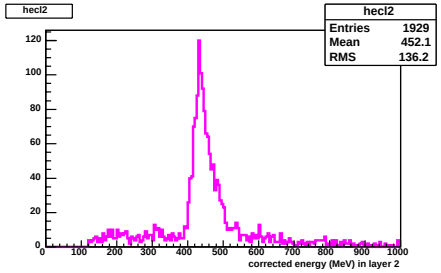


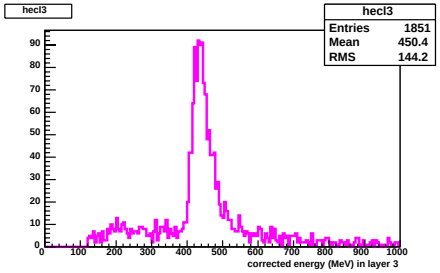


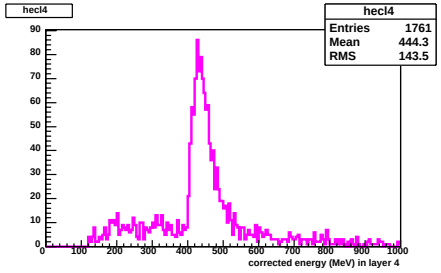


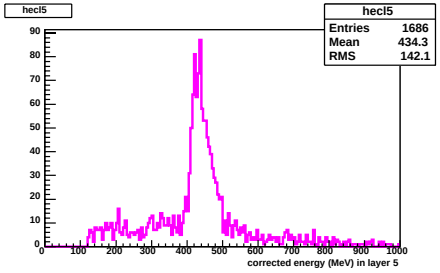


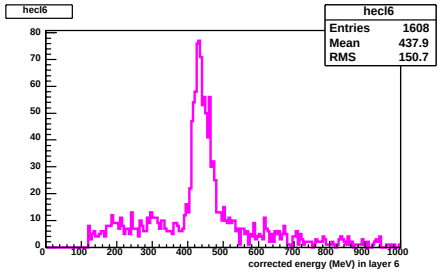


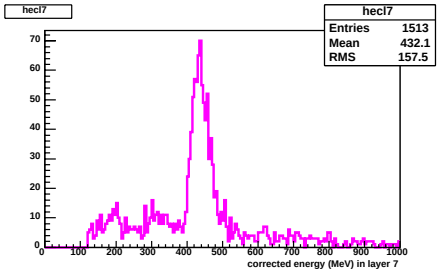




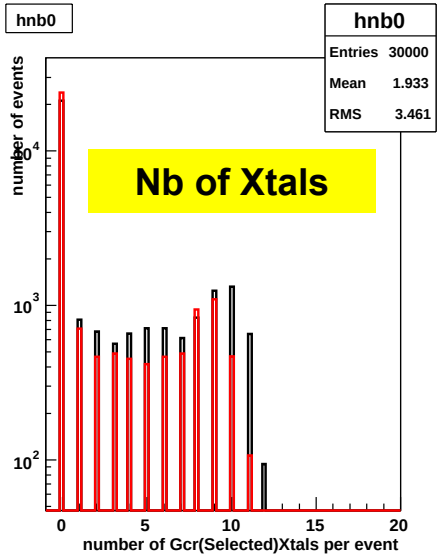


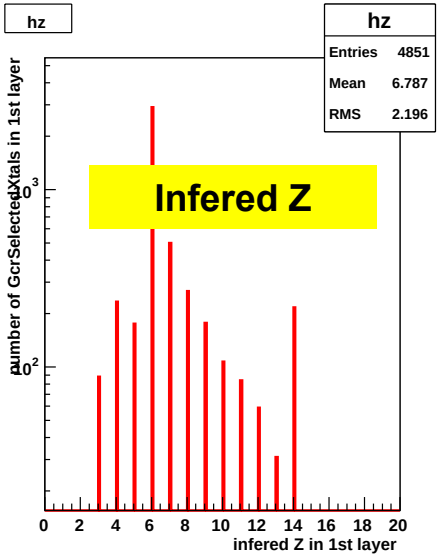


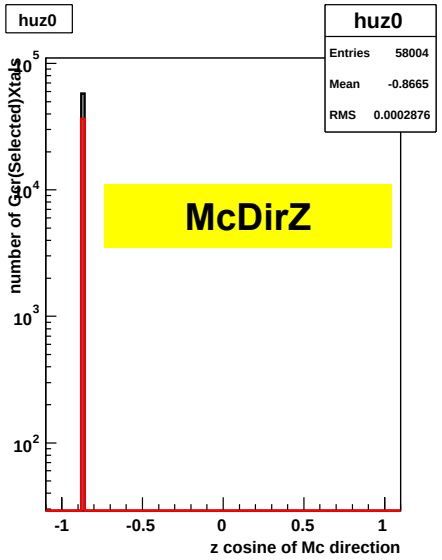


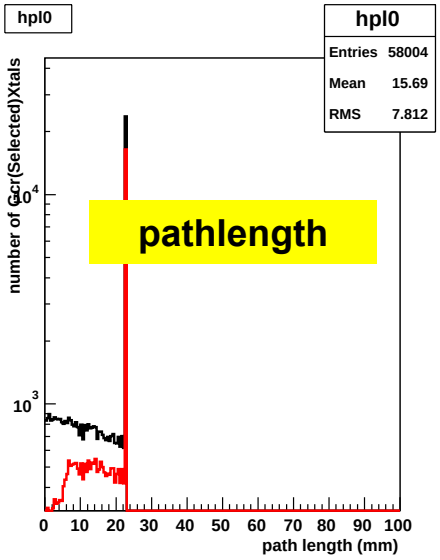


Simulations of C at 30 deg

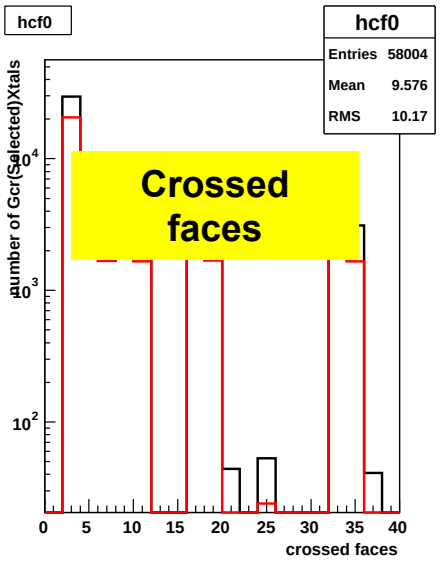


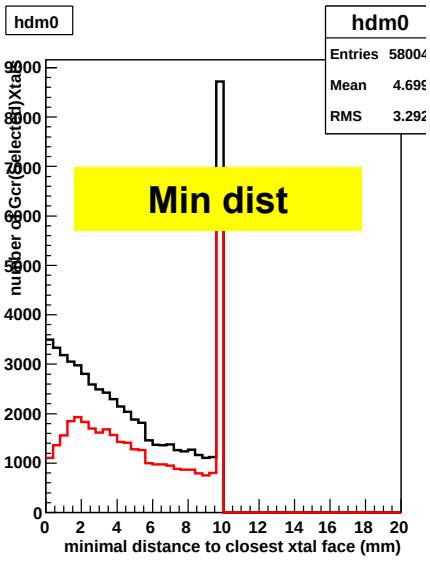


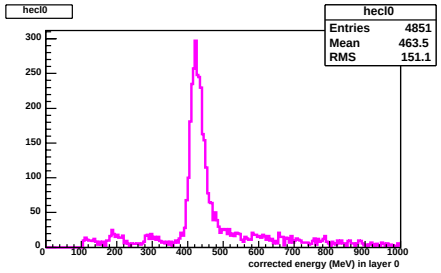


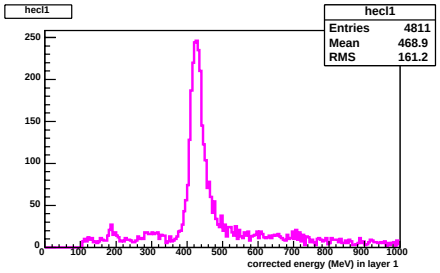


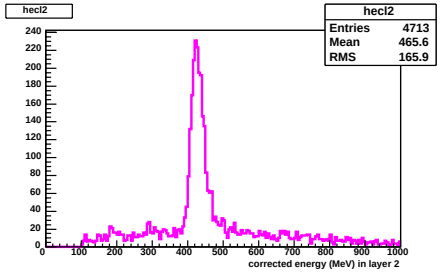
Simulations of C at 30 deg

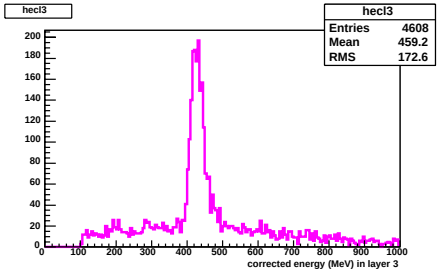


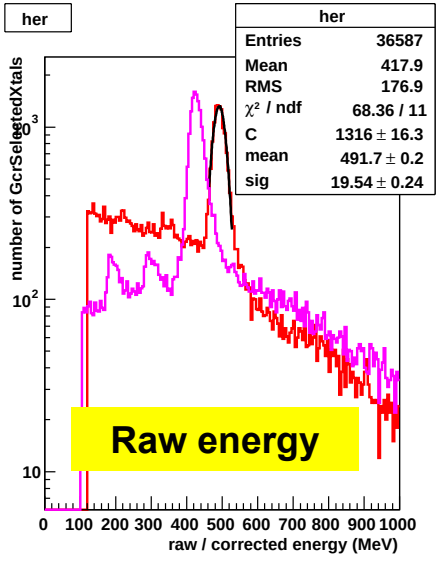


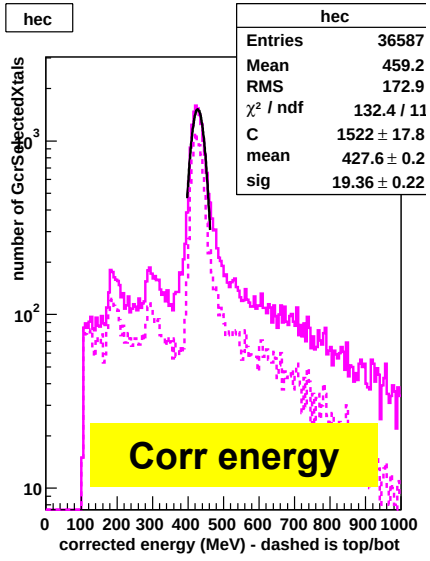


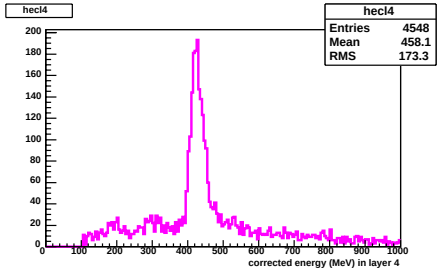


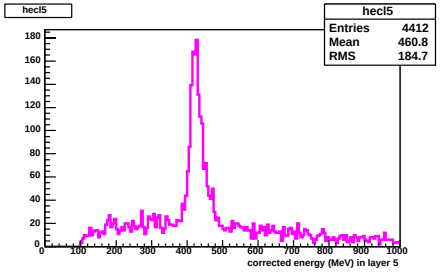


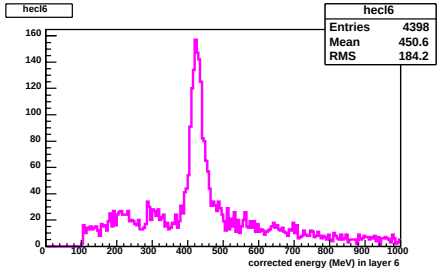


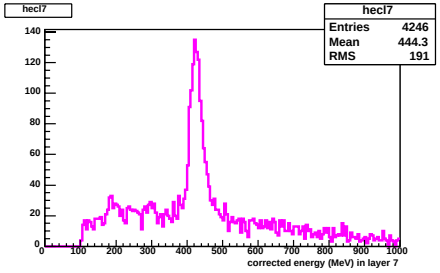




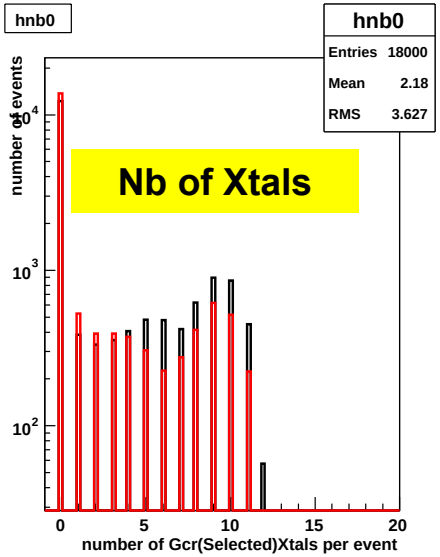


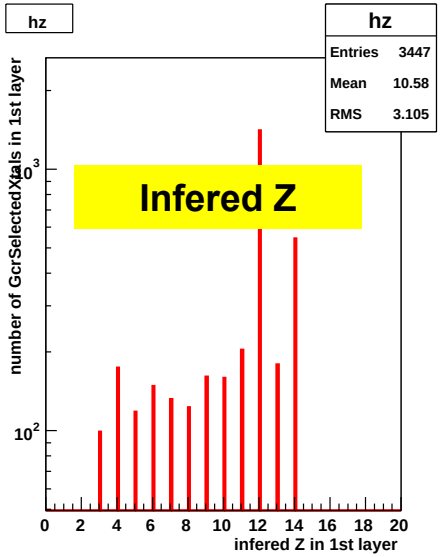


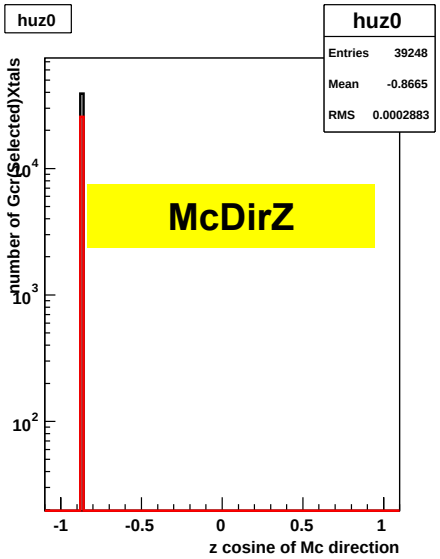


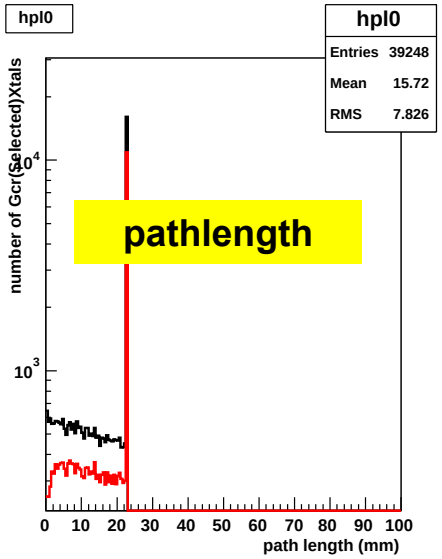


Simulations of Mg at 30 deg

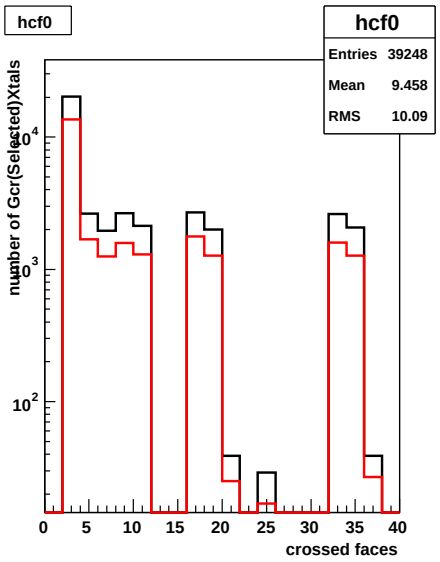


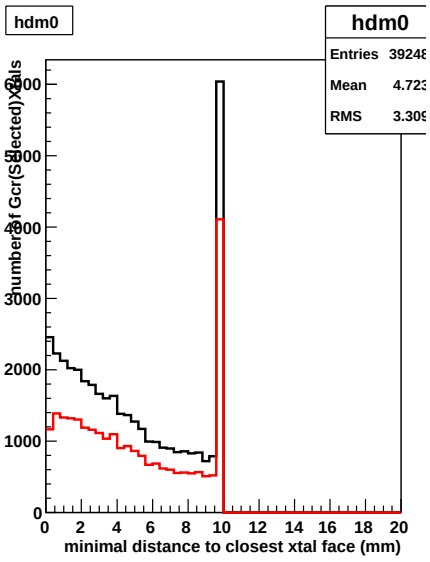


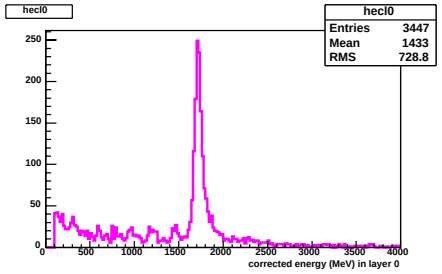


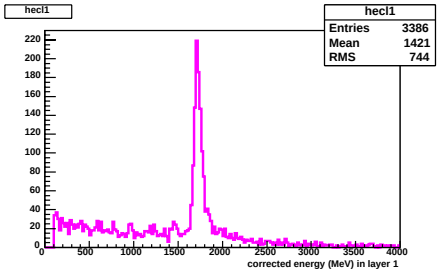


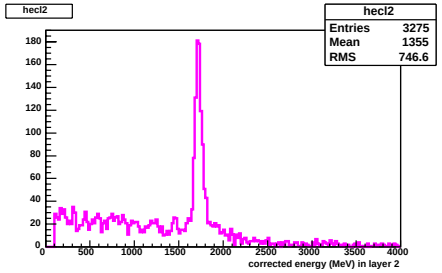
Simulations of Mg at 30 deg

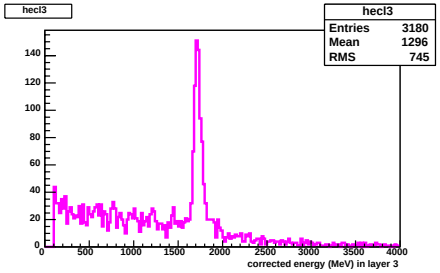


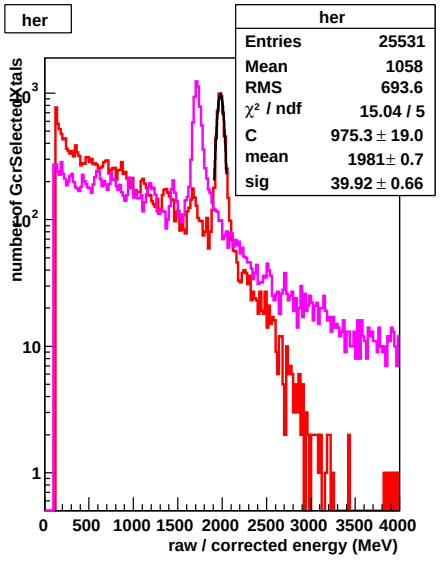


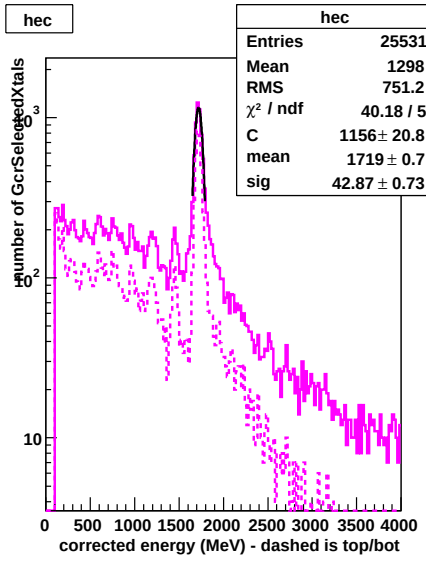


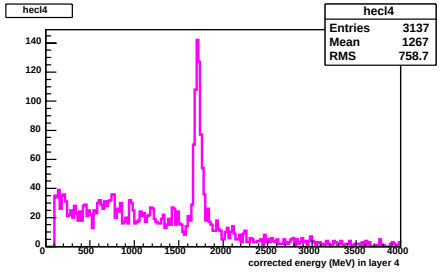


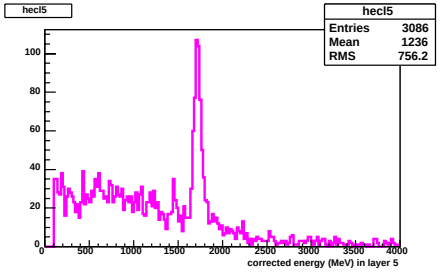


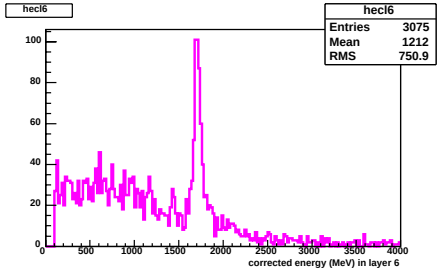


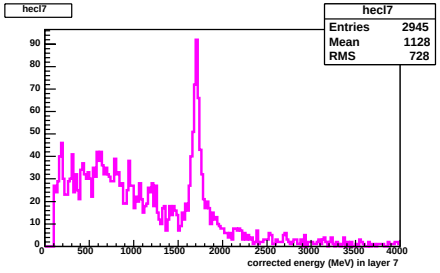












Conclusions

- Code implemented and running
  - Some cleaning (+comments) still necessary before checking in CVS
  - Simulation procedure (scripts, meta database) in CC IN2P3 (Lyon) is fully operationnal
- First results are encouraging
- Next steps:
  - Simulate larger samples and get more accurate number for efficiencies of each step (using HPSS disk at CC-IN2P3)
  - Simulate heavier ions than Mg
  - Consequences on SC 1 simulation needs ?
- To do (discussion):
  - TKR: need for an adapted recon for ions
  - ACD: need for an estimate of Z using the high-energy range of PMs
  - CAL: study energy sequence and correlation between layers kept for calibration (multiplicity criterium)
    - Study heaviest ions slowing down
    - Reject high energy tail of peak

UML diagram for GCRRecon and GCRSelect