LHCb software and MoEDAL simulation update

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ICHEP poster

- The ICHEP conference went smoothly
  - Proceedings are currently being written

- There was interest in the unusual detection methods, especially from younger students.
  - The idea of "actually having" a monopole in the MMTs in order to prove discovery seemed to resonate.

- The abstract and a copy of the poster can be found here: https://indico.ific.uv.es/indico/contributionDisplay.py?contribId=1060&sessionId=16&confId=2025

MonopolePhysics package

- The MonopolePhysics package has been updated to correctly manage magnetic fields.
  - I've also modified the setup scripts to work only on lxplus.
- In the absence of an SVN, the most recent code can be found in my local lxplus directory:
  - /afs/cern.ch/user/m/mking/public/MoEDAL/code_v2
- There is also an analysis macro that produces histograms from the results file and is easily modifiable to perform any type of analysis on them.

Monopoles in magnetic fields

- Some MoEDAL NTD plates inside LHCb were being considered
  - Need to know how monopoles travel inside LHCb's magnetic field

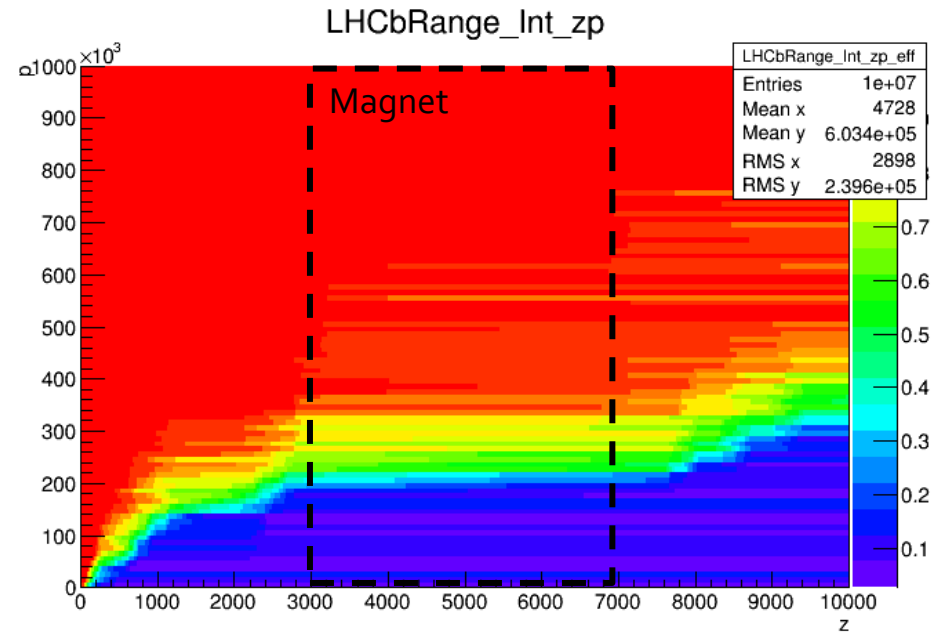
- It was observed that, under the influence of magnetic fields, monopoles would no stop in Geant4, but crawl along the field and stop in the cavern floor.
  - This is clearly unphysical.

- The reason for this is that the Geant4 monopole dE/dx equation returns $dE/dx = k * \beta$ for $\beta < 0.1$.
  - This was solved by adding a cut that killed monopoles with $\beta < 0.01$
  - In future a more accurate description of monopole energy loss at low β would be preferred

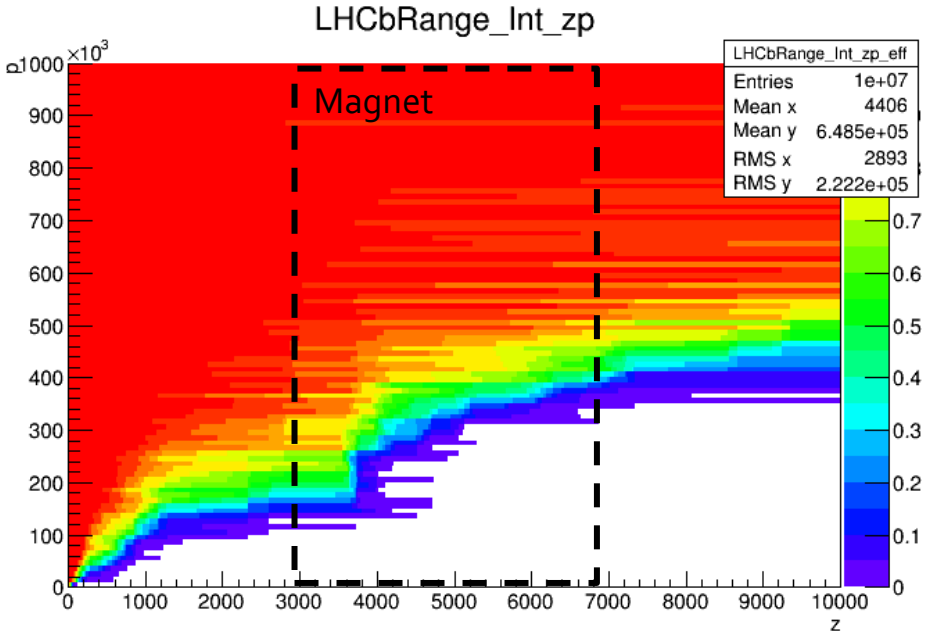
Monopoles in magnetic fields

- Run tests on 1TeV monopoles produced in η>3 cone.
- Plot shows integrated *z* range (*x*-axis) vs monopole momentum (*y*-axis)
  - Magnetic field effectively stops any monopoles with *p*<450GeV

Magnetic field = OFF



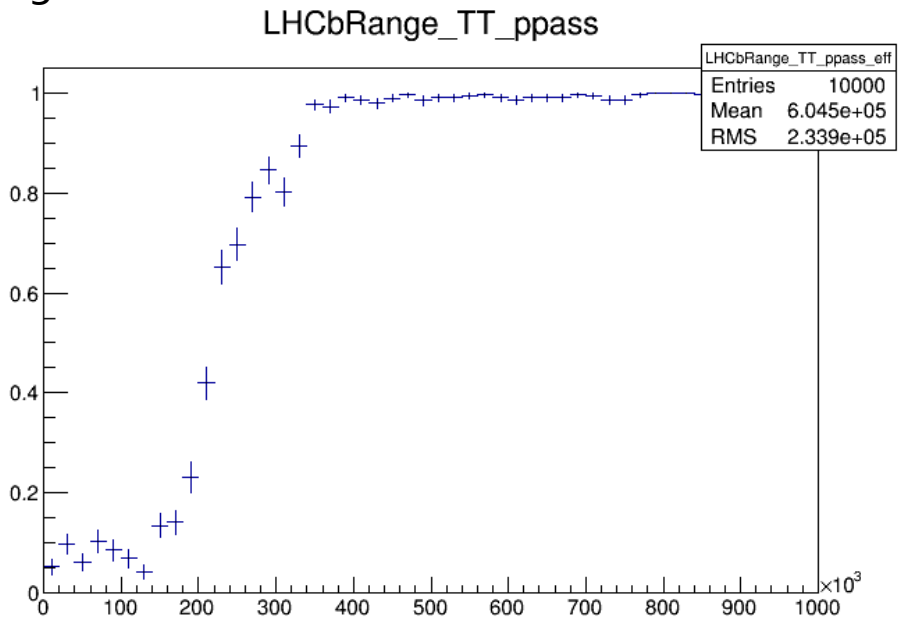
Magnetic field = ON



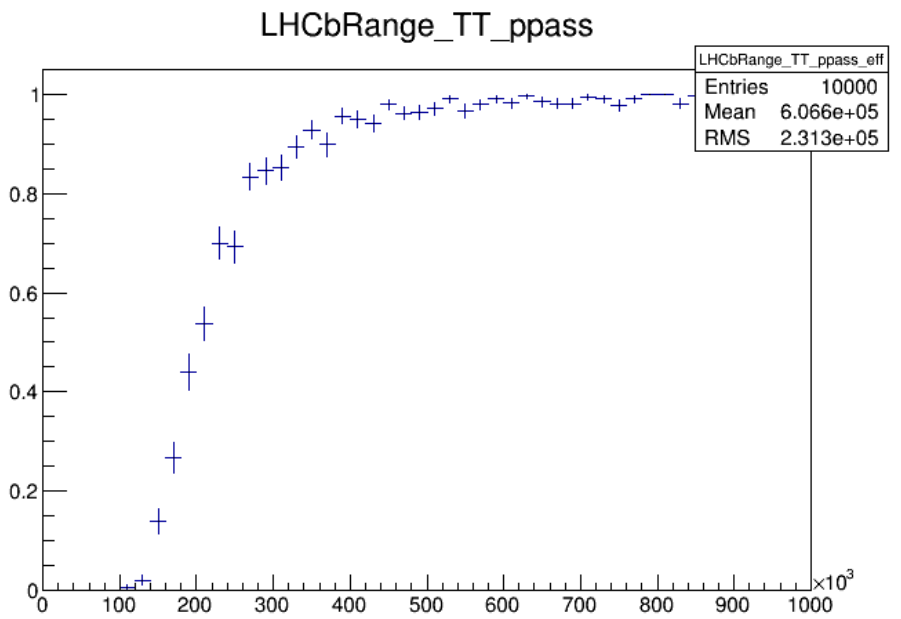
Monopole pass fraction at TT

- The TT station is located at $z \approx 2.5$m, before the magnet
- The magnetic field has minimal effect on the fraction of monopoles that pass it.
  - The small fraction that pass at low p when the magnetic field is off are likely traveling down the beampipe

Magnetic field = OFF



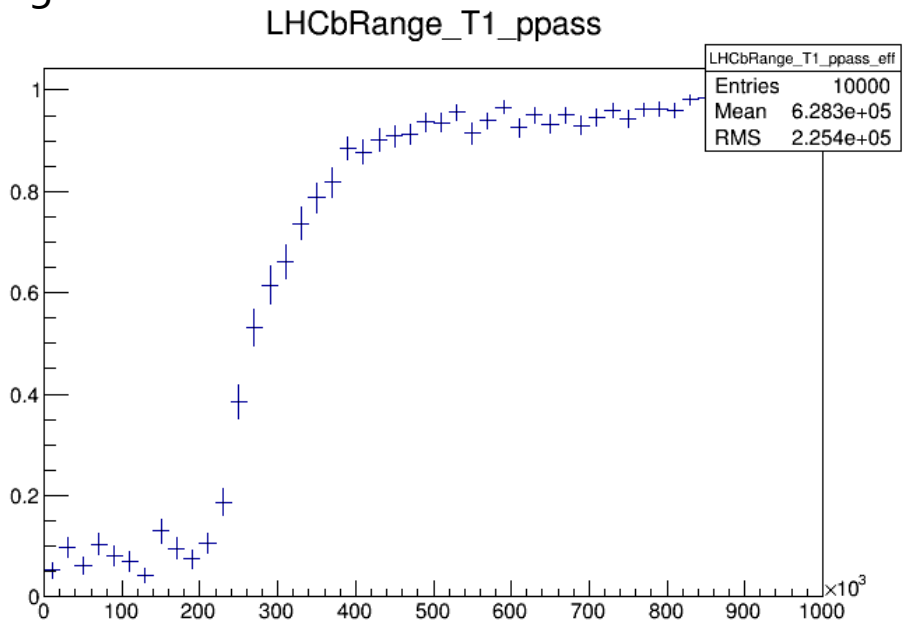
Magnetic field = ON



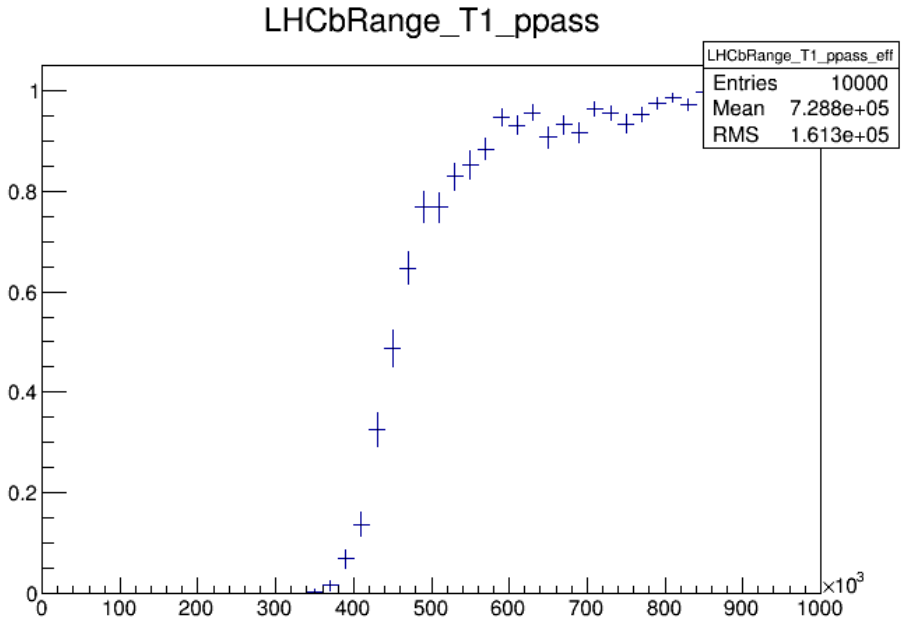
Monopole pass fraction at T1

- The T1 station is located at $z \approx 8$m, after the magnet
- The magnetic field has a strong effect, stopping almost all monopoles with $p < 400$GeV

Magnetic field = OFF



Magnetic field = ON



LHCb computing update

- Gauss jobs can be run on lxplus with no problems from an ATLAS account.

- Running on lxbatch or the grid is proving more of a challenge.
  - Ganga does not seem to accept job option files, even when following tutorial examples. I have no idea why this is.

  - lxbatch jobs can be started manually, without Ganga, but fail to set up Gauss as they cannot find the correct gcc version on the batch nodes
    - Support have no clue why this is, although the first response was:

      "I think that when you become part of the LHCb group on AFS (z5) perhaps you will get the proper environment and then this problem will disappear."
    - May be worth applying pressure for some kind of LHCb accounts after all