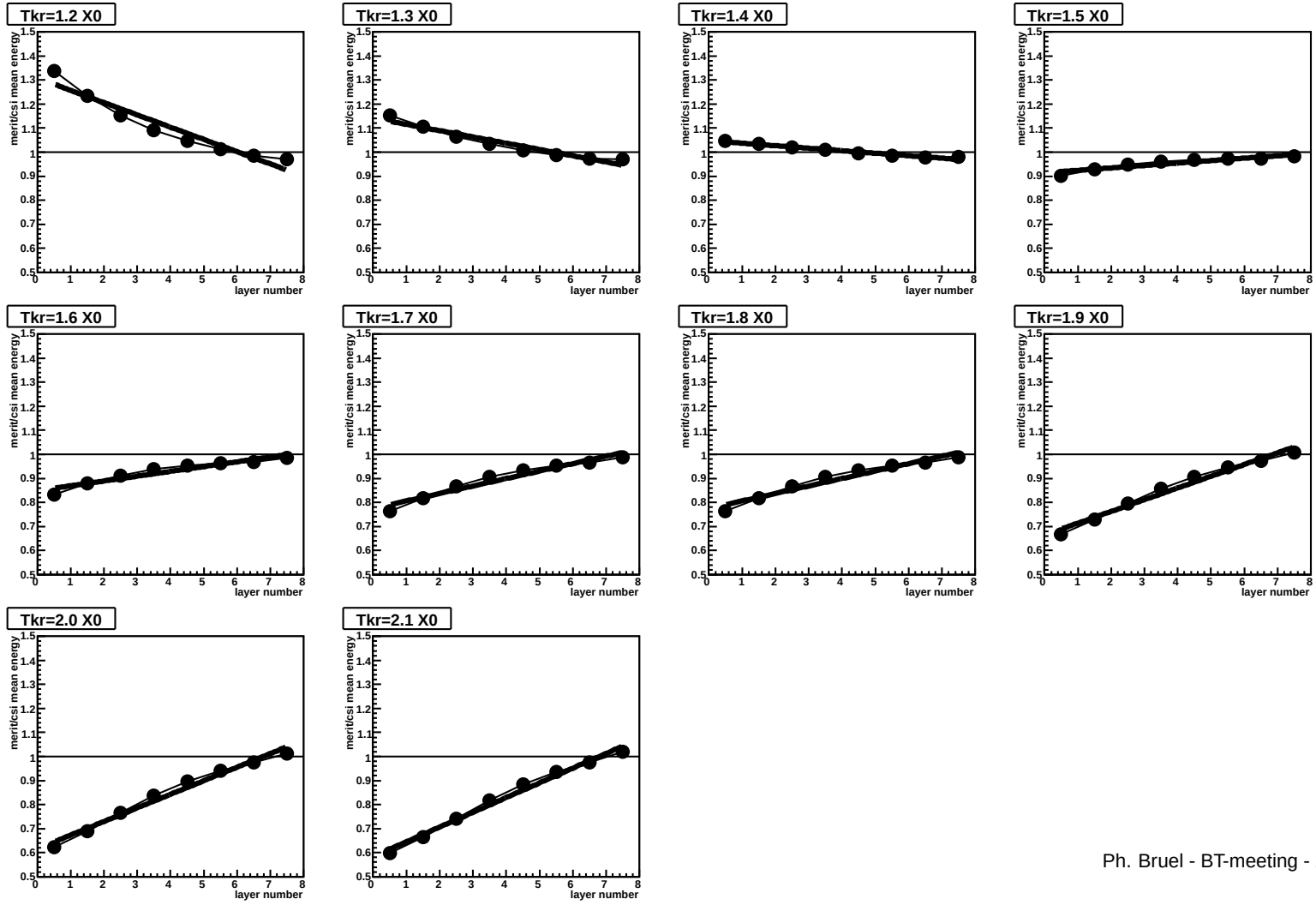
Standalone Geant4 and extra X0

- one preshower of CsI (tracker+extra material) and 8 layers of CsI (19.9mm)
- look at the ratio of the mean energy in the merit over the mean energy in the standalone MC for each layer
- how does it change when increasing the preshower thickness ?

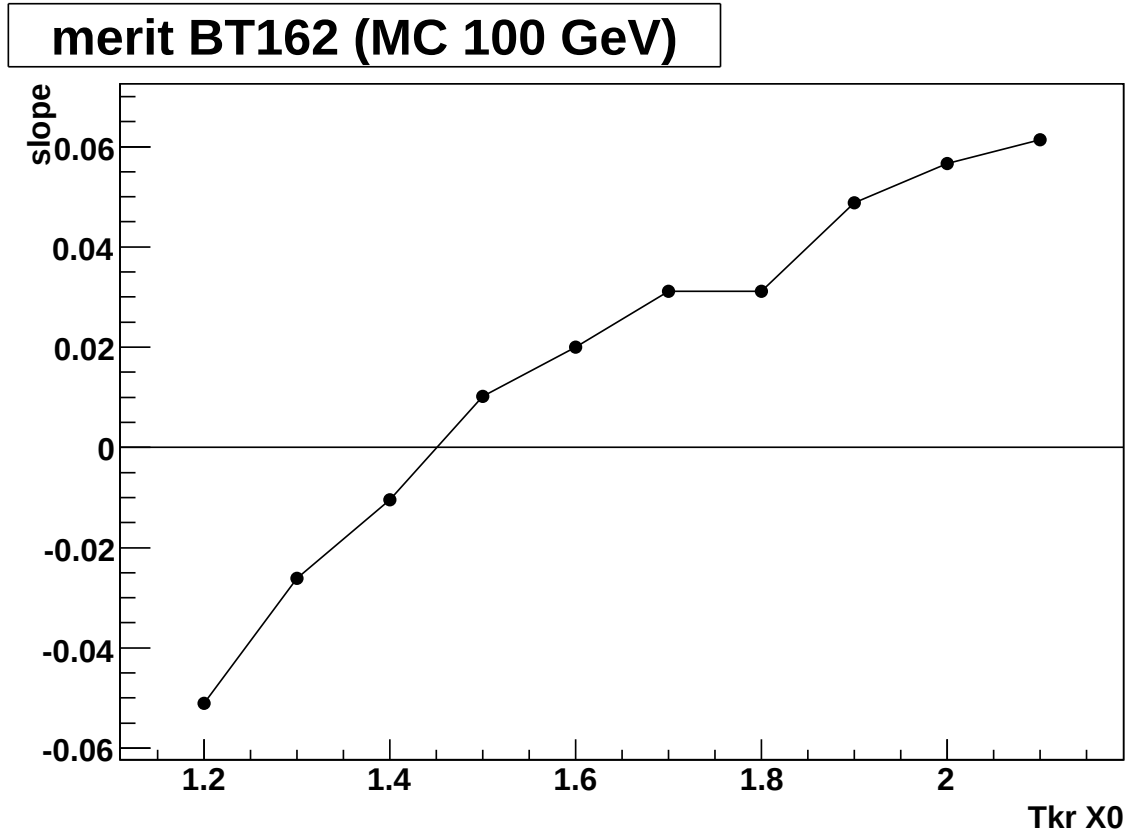
CU simulation / G4 standalone

increasing the preshower thickness from 1.2 to 2.1 X0



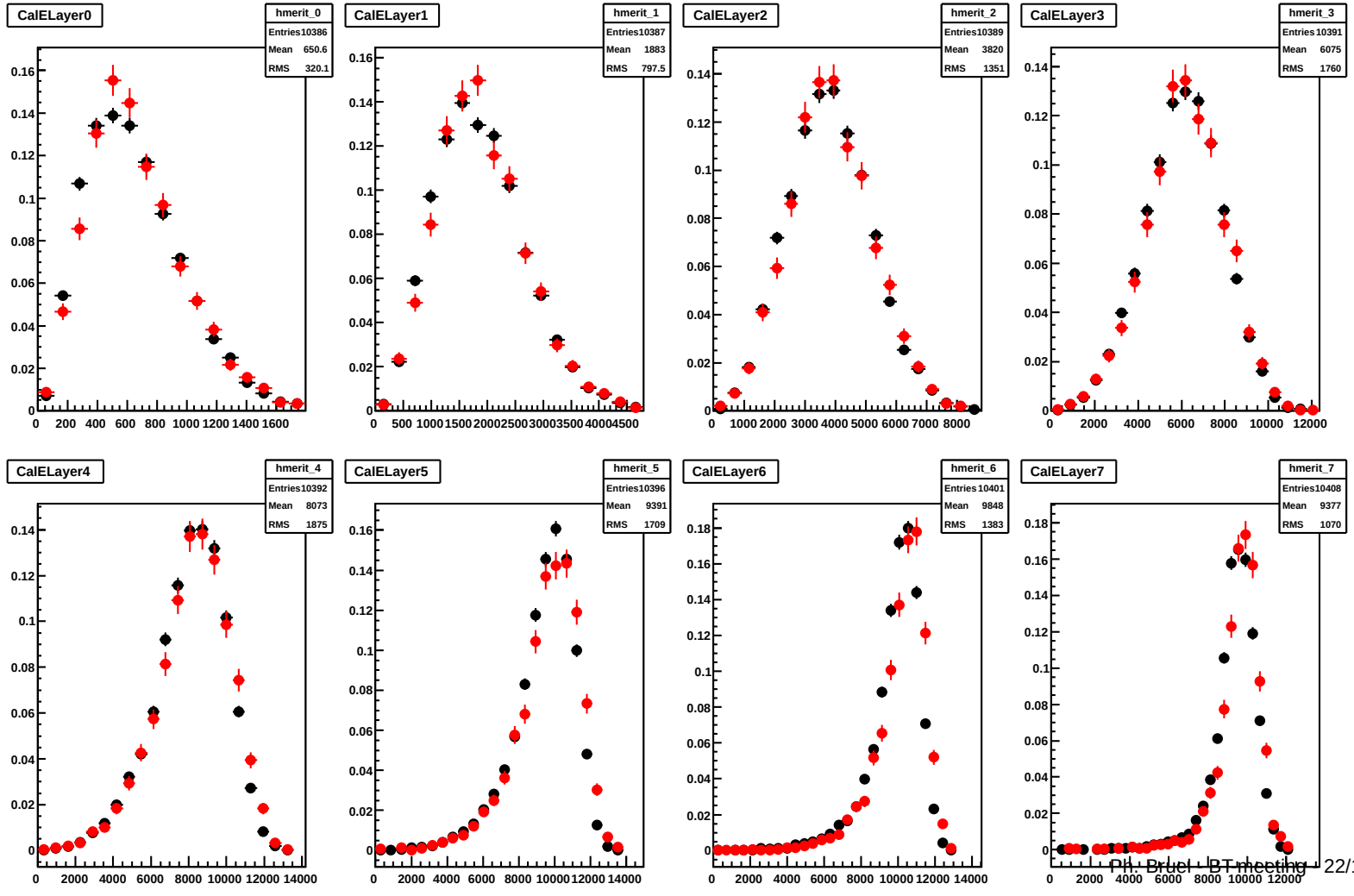
X0s upstream the cal in MC

In the CU simulation : tracker + extra material = 1.45 X0



CU MC and 1.45 X0

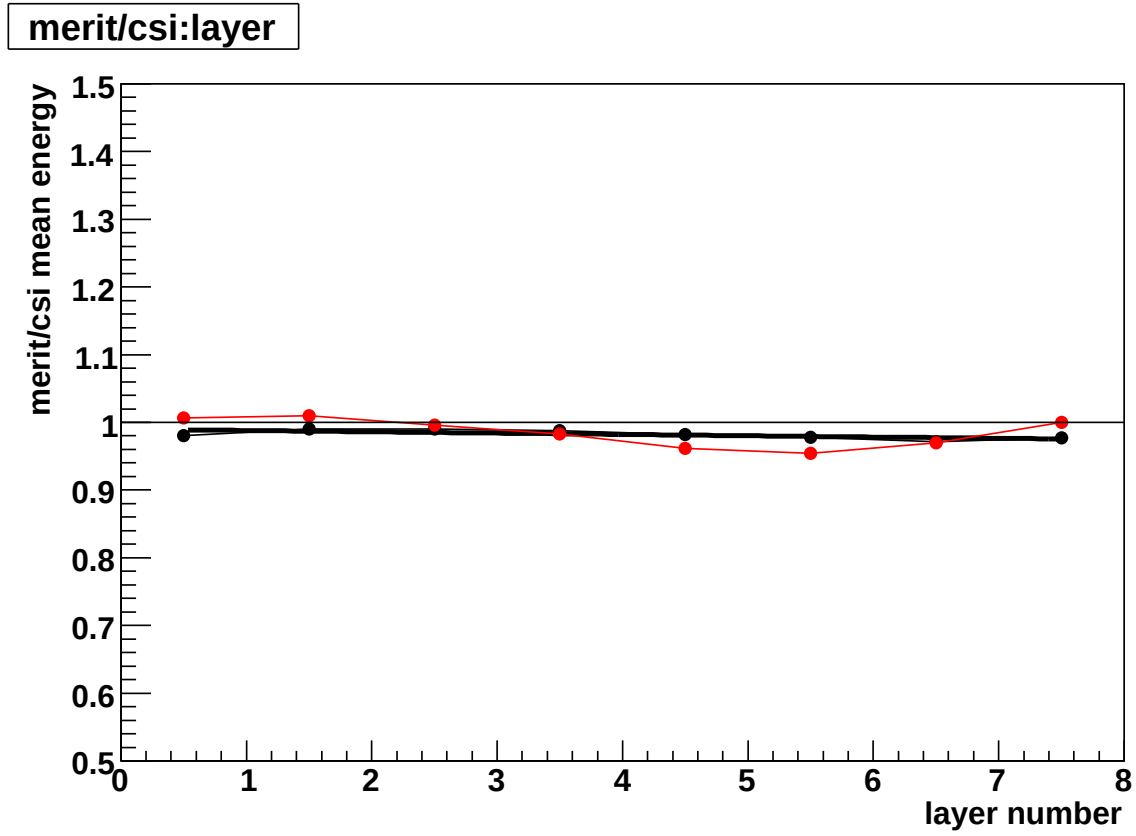
merit BT162 (black) and standalone G4 with 1.45 X0 (red)



CU MC and 1.45 X0

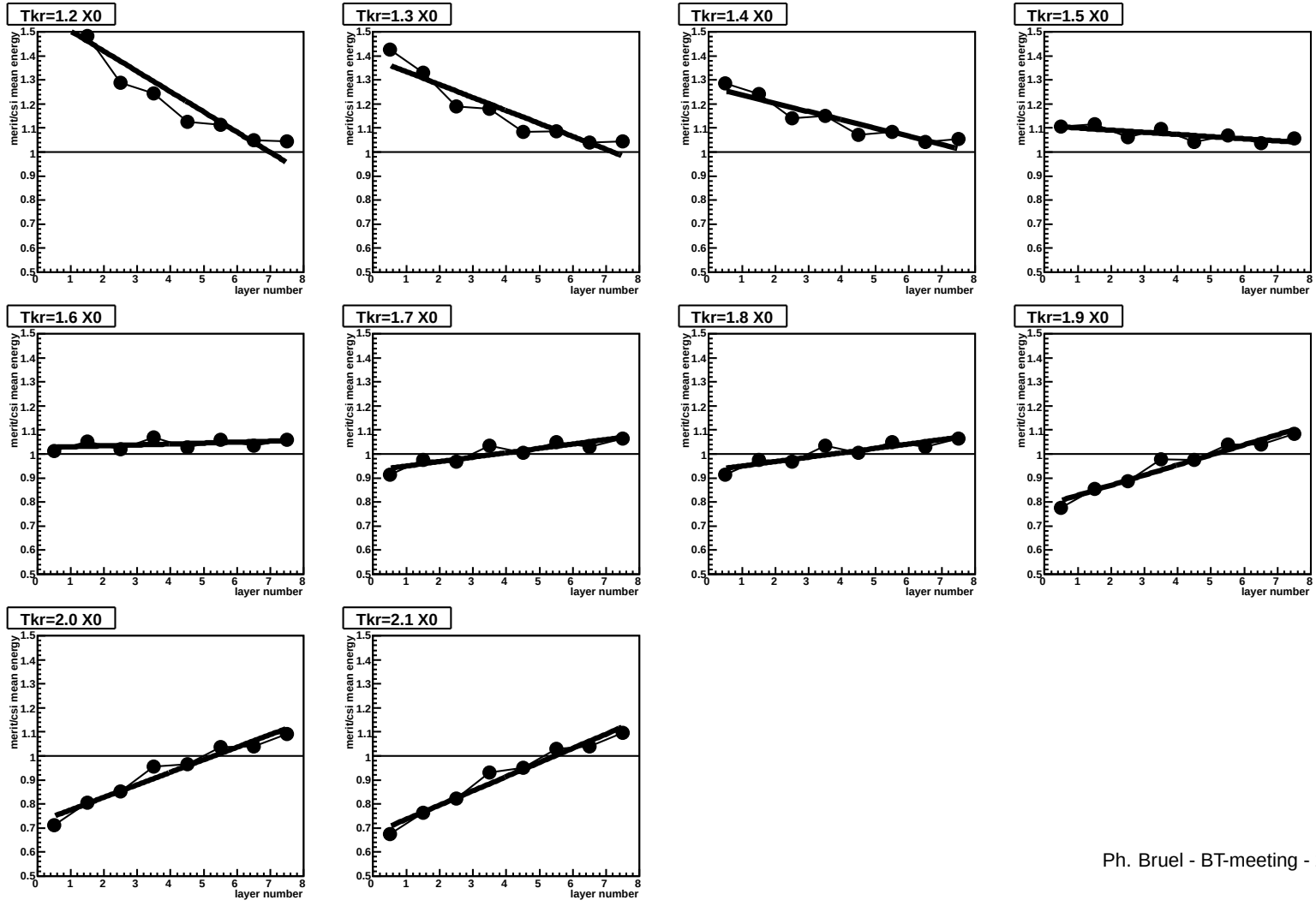
merit BT162 and standalone G4 with 1.45 X0

mean energy ratio (black) and RMS energy ratio (red)



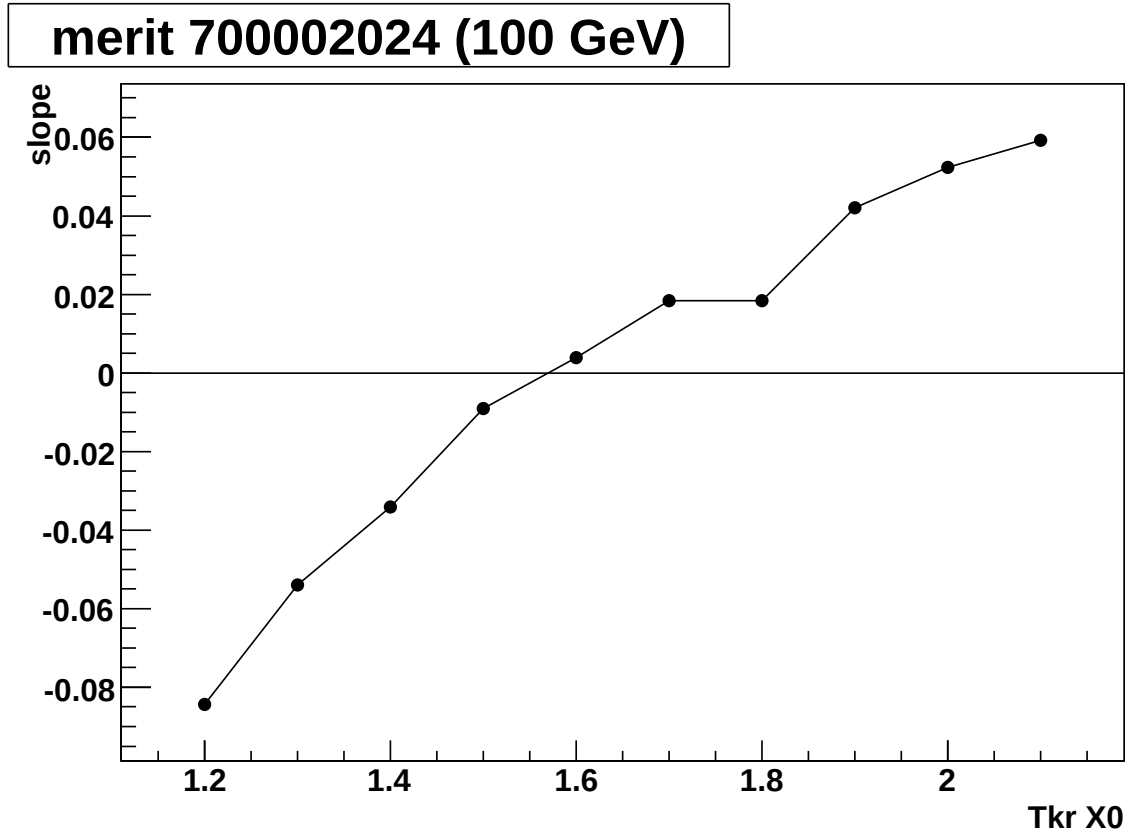
CU data / G4 standalone

increasing the preshower thickness from 1.2 to 2.1 X0



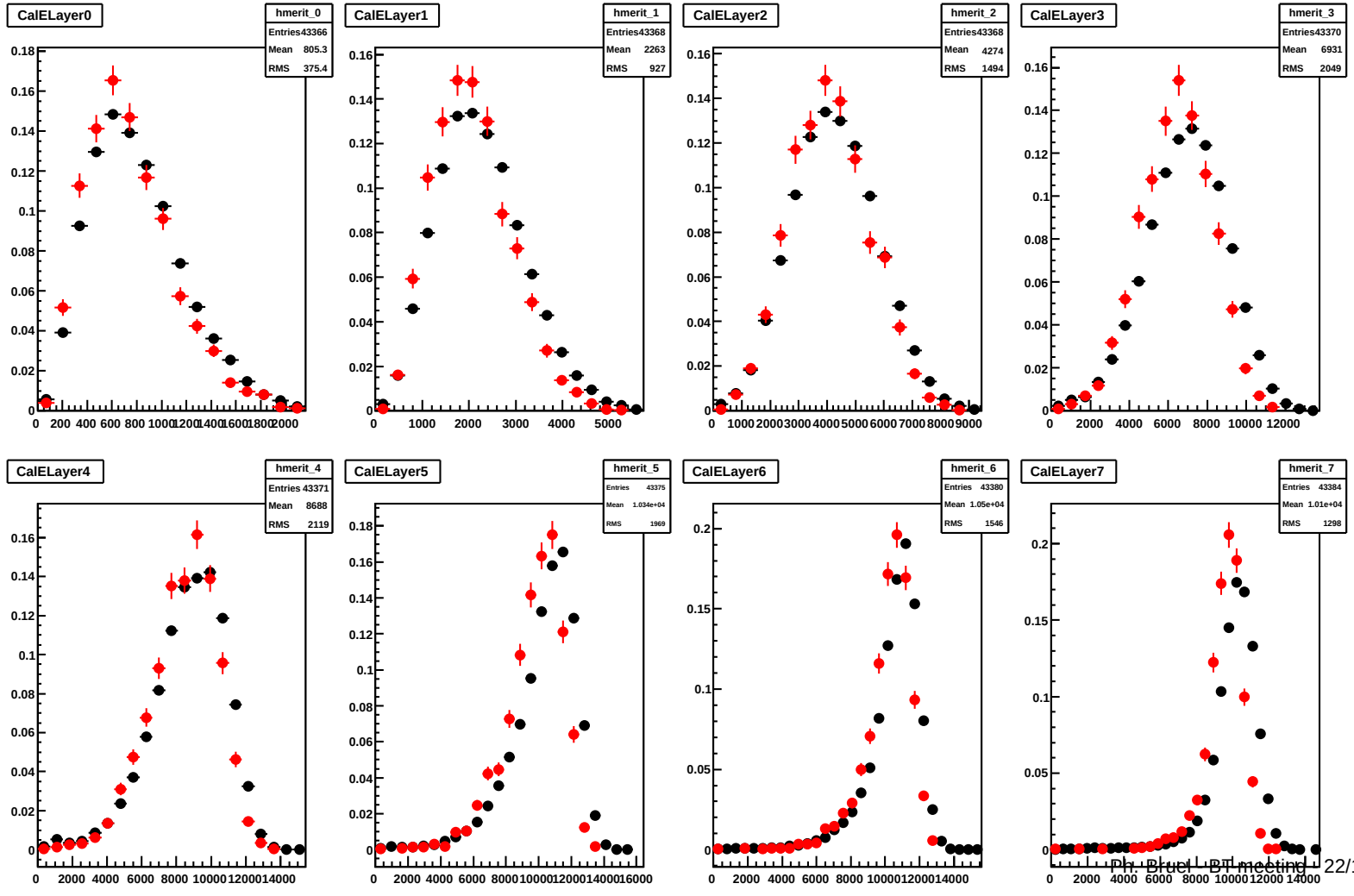
X0s upstream the cal in data

In the CU data : tracker + extra material = 1.55 X0



CU data and 1.55 X0

merit 700002024 (black) and standalone G4 with 1.55 X0 (red)

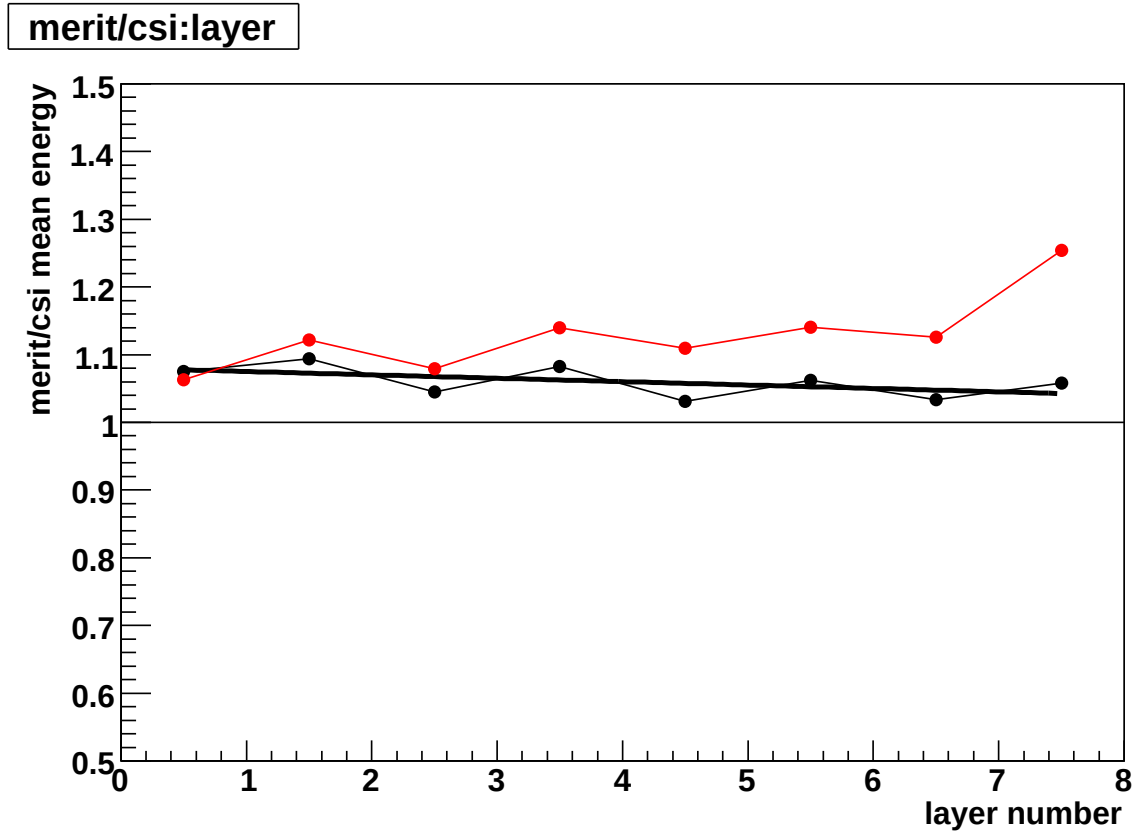


CU data and 1.55 X0

merit 700002024 and standalone G4 with 1.55 X0

mean energy ratio (black) and RMS energy ratio (red)

the mean energy ratio is almost constant $\sim$ 5%



Conclusion

The data/MC discrepancy for on-axis 100 GeV electrons can be explained by :

- 0.1 X0 extra material in front of CU (any idea ?)
- a $\sim$ 5% miscalibration (bad nonlinearity correction because of beam conditions ?)

This scenario should be checked at :

- other energies (at 10 GeV the discrepancy is already constant and $\sim$ 5%...)
- other angles (30 deg simulation is being produced)