Mean current in PRS MultiAnode Photomultipliers in the upgrade scenario

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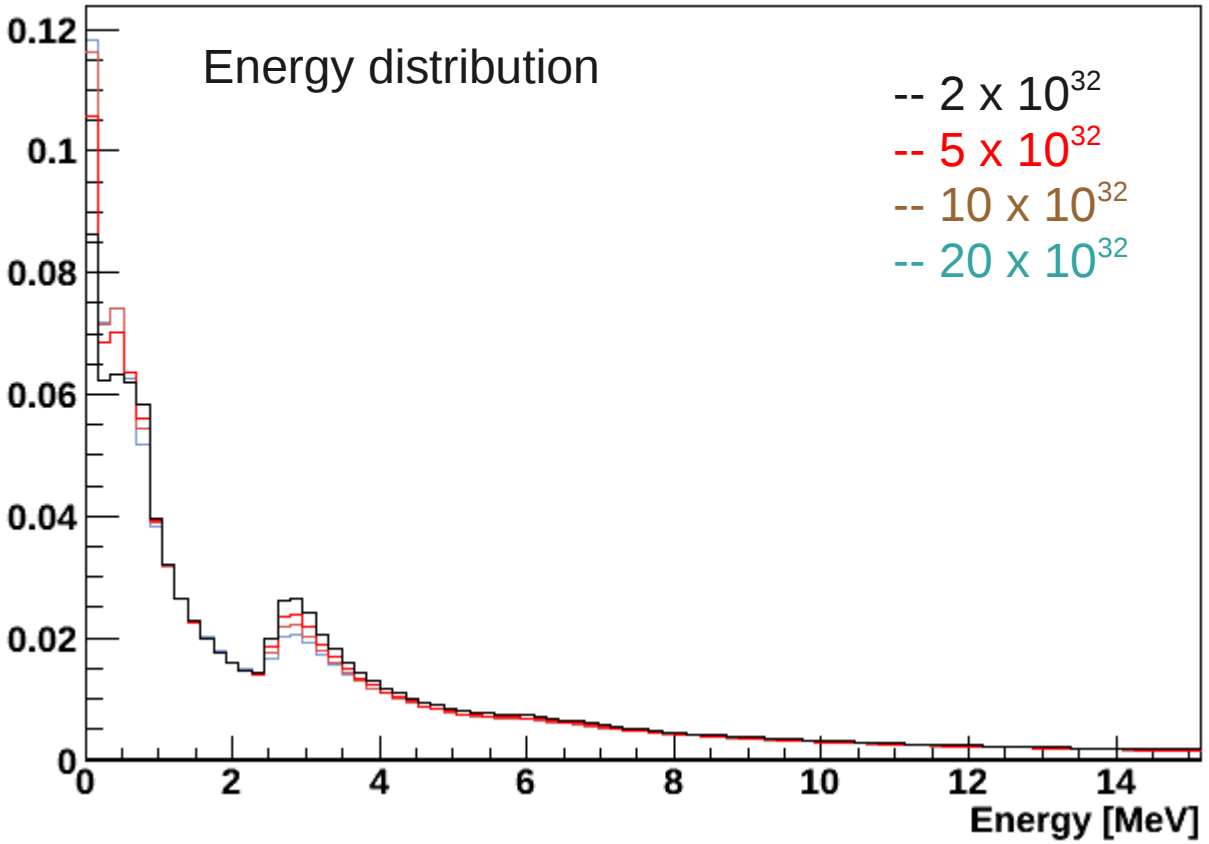
Data sample

- 4 data samples 25ns with different luminosity: 2, 5,10, 20 x 10^{32}
- Only inclusive b available in xdst format: needed for acceding sim information
  - Difficult to compare with the precedent study made on minbias
  - Conservative approach: larger energy deposit is expected

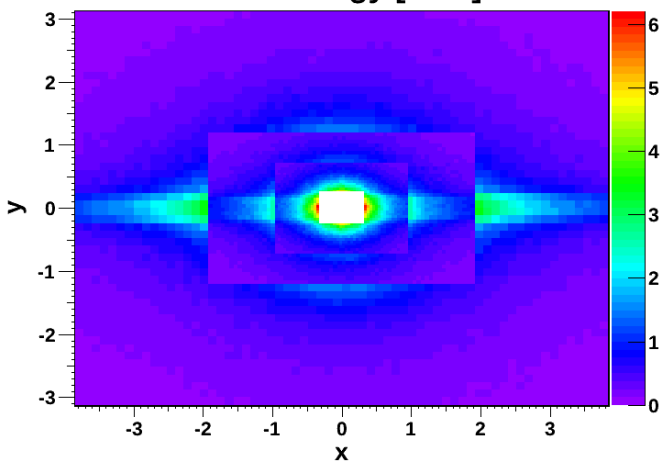
References for last measurement

- ECAL-LHCb Note 2003-03
- LHCb-CALO 2003-044

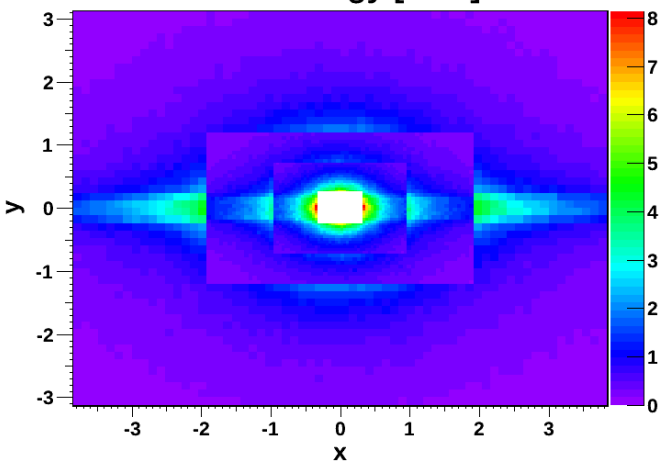


Mean energy deposit

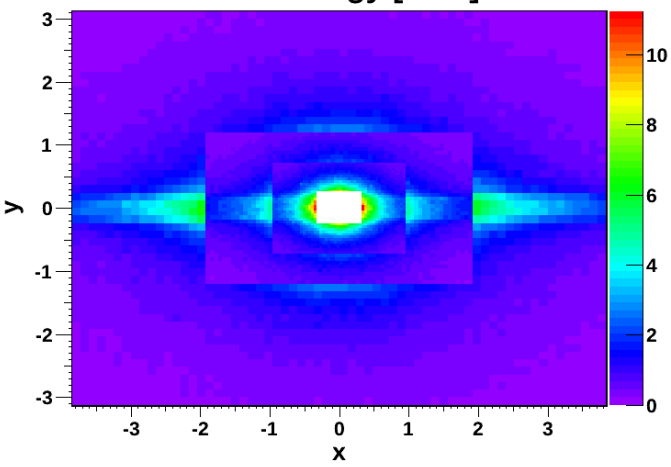
2 x 10^{32}

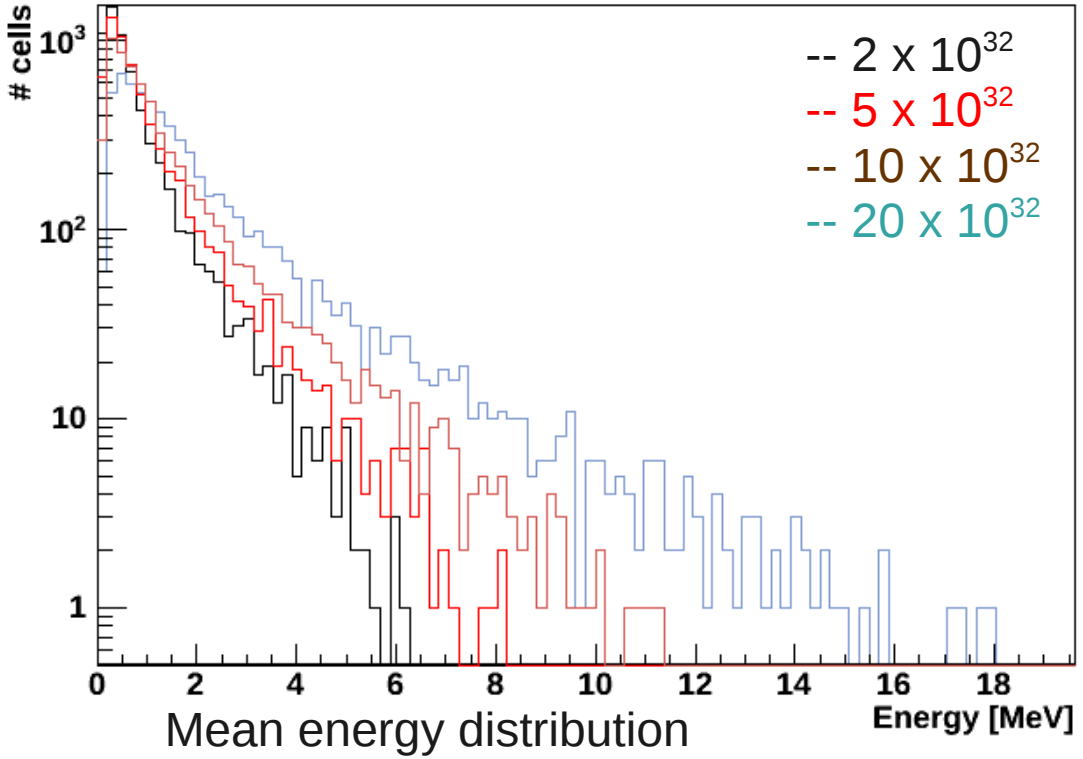


5 x 10^{32}



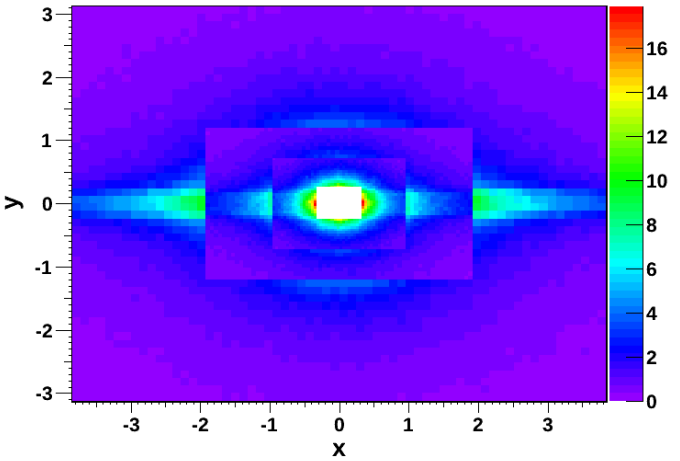
10 x 10^{32}





Mean energy distribution

20 x 10^{32}



- The sample with Lumi=2x10^{32} return ~3 times the energy of the previous measurement (inclb vs minbias)

Mean current

The mean current can be calulated using the following relaction: I = Q x E x fe
Where Qi = Qref x R x (gi/gref)

Fe (ev/s) = everage event frequncy including the fraction of interaction bunch crossing
fe= 14.75 MHz x 2 (considering 100 % bunch crossing), x 1 (with 50 % bunch crossing)

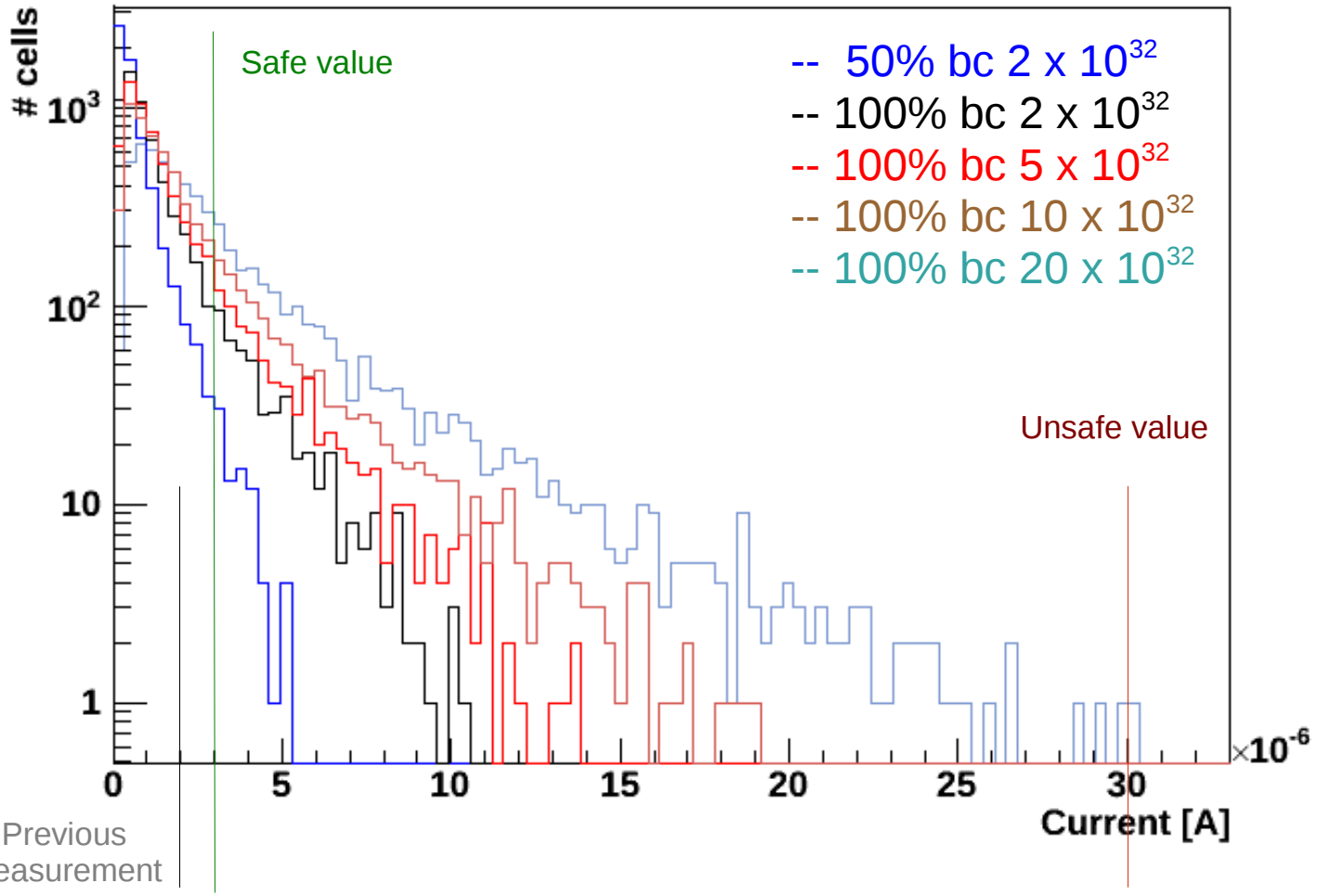
E (MeV/ev) = energy deposit

Q (C/MeV) = total anode charge per MeV

Qref= anodic charge for reference channel and for MIP deposit = 156 fC/MIP

R= 1/(2.74 MeV/MIP) is the MIP to MeV conversion factor

(gi/gref) relative channel gain = 1 in this study



Summary

- Test performed on 4 different samples: with different luminosity: 2, 5,10, 20 x 10^{32}
  - MC contains only b-inclusive samples: conservative approach.
- Mean energy deposit ~ 3 times higher than than the previous measurement in the case 2 x 10^{32} (incl-b vs. min-bias).

- We have direct stress test of the Multianode Photomultipliers only for 2 values:
  - 3 μA = safe value , 30 μA = unsafe values.
  - Limit values is then expected somewhere between the two.

- Some cells presents mean current values between 3 μA and 30 μA.
  - It is likely we will loose some PRS channel (the most internal ones) in case of Upgrade.
  - The number will depend on the particular scenario.

- This is an conservative scenario. With a min bias MC sample in xdst format available it is possible to have a better prediction.