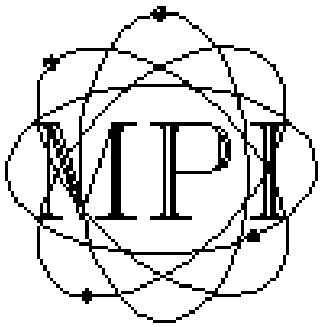
MC Simulation for Combined TB

D. Salihagić, A. Kiryunin



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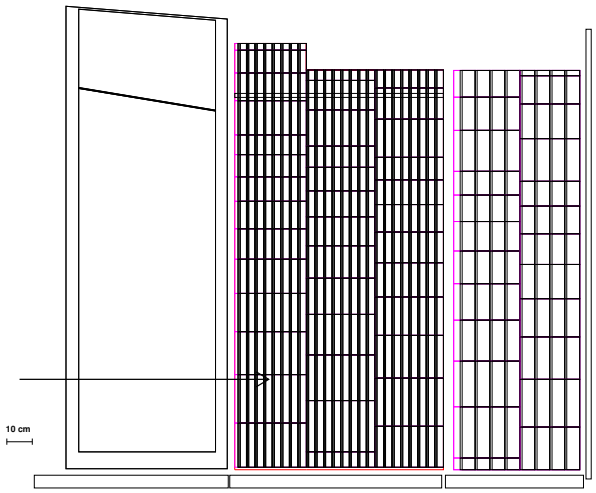
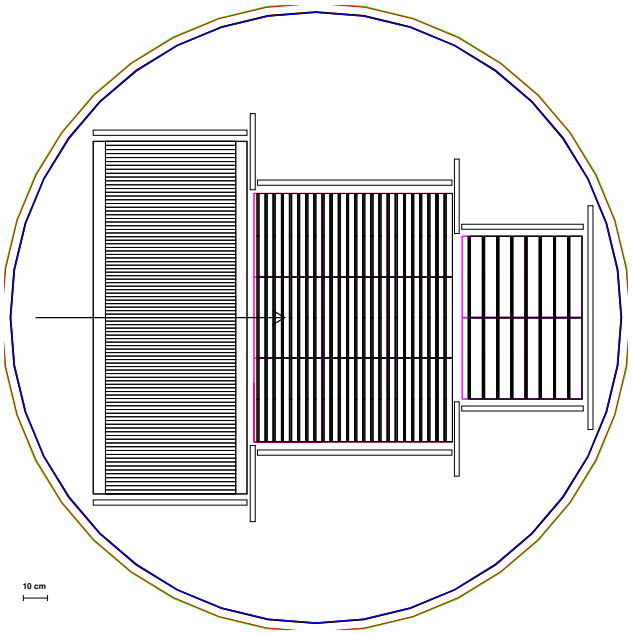
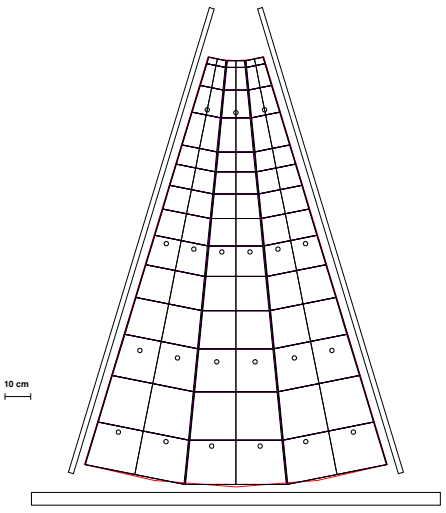
Status

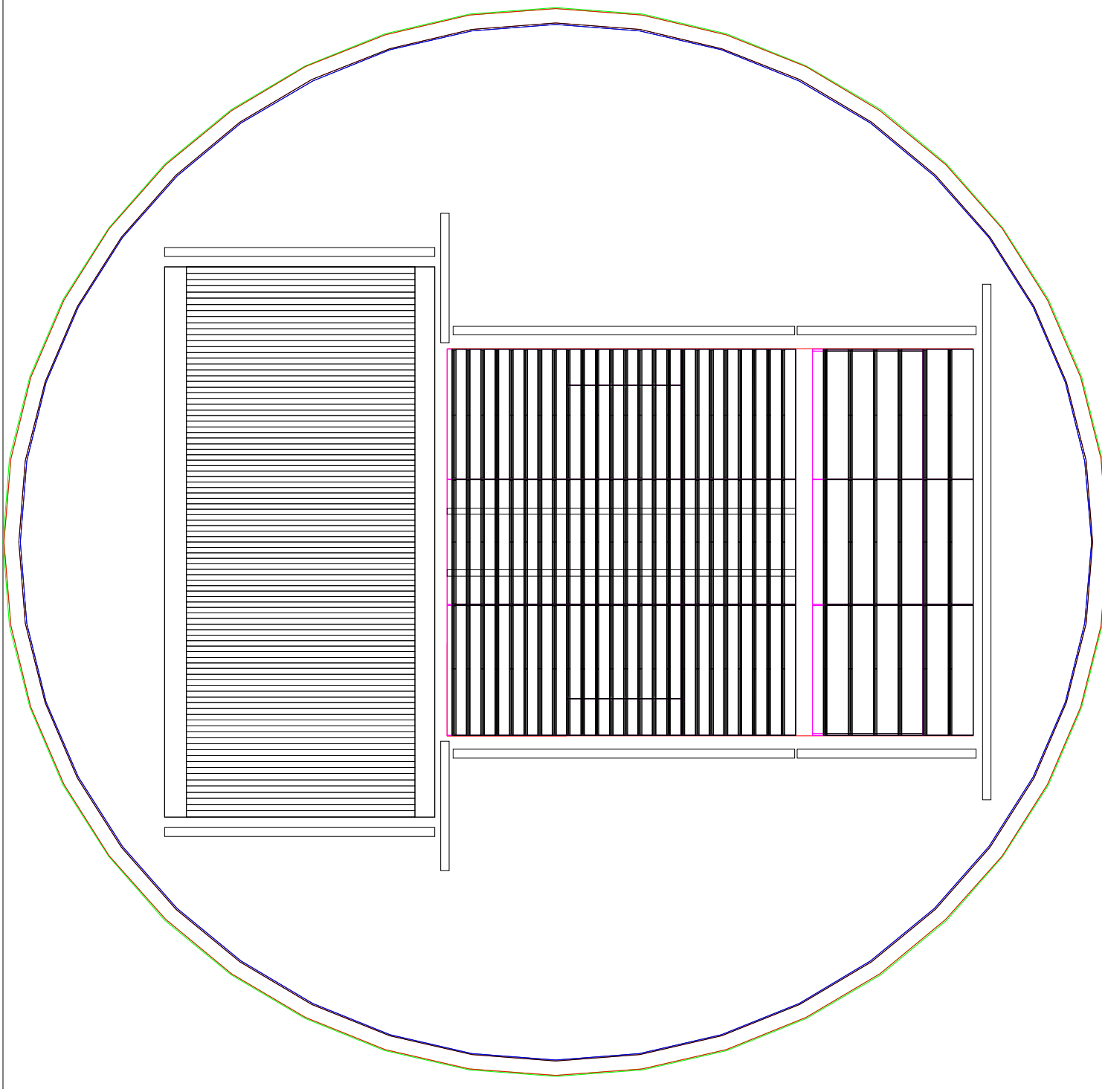
Current status:

- Version 1:
  - 3 HEC-1 modules
  - 2 HEC-2 modules (8 gaps)
  - 1/8 of EMEC wheel
- Version 2:
  - 3 HEC-1 modules
  - 3 HEC-2 modules (6+6(!!8)+6 gaps)
  - 1/8 of EMEC wheel
- "Leakage detectors"
- H6 beam line elements – from HEC-BEAM 3.0
- EMEC – from C. Benchouk & A. Chekhtman
- Simulation framework – Atlsim


10 cm


10 cm

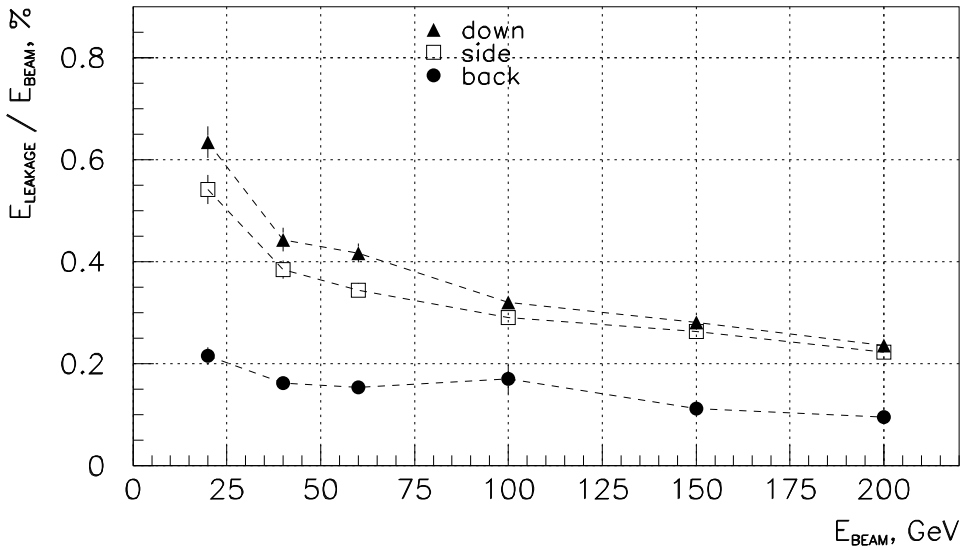

10 cm



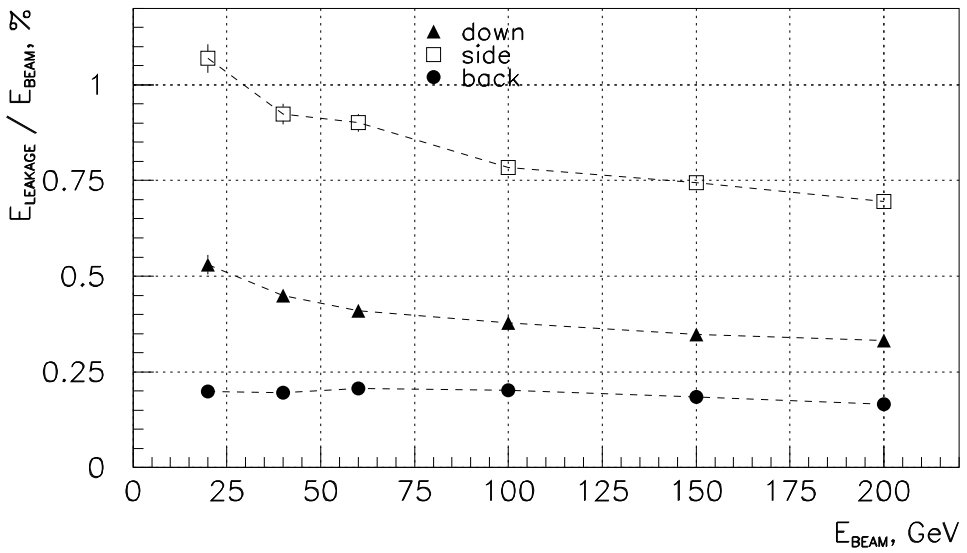
Simulation done

- Charged pions: 20, 40, 60, 100, 150, 200 GeV
- 1200 events per energy
- $X_{CRYOSTAT}$=5 cm, Y_{TABLE}=12.4 cm
- GCALOR - hadronic shower model
- No "charge correction" in EMEC

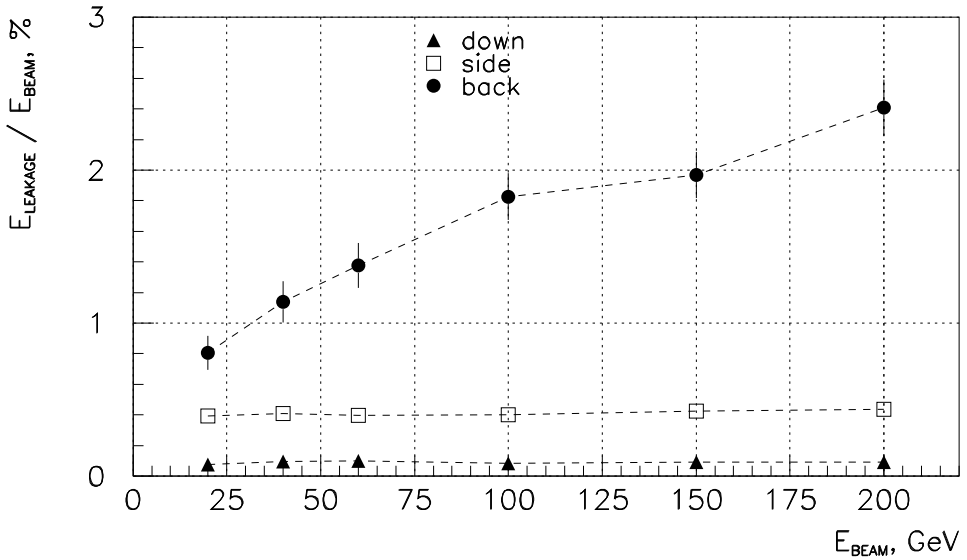
Leakage Energy for Pions in Combined Test



EMEC

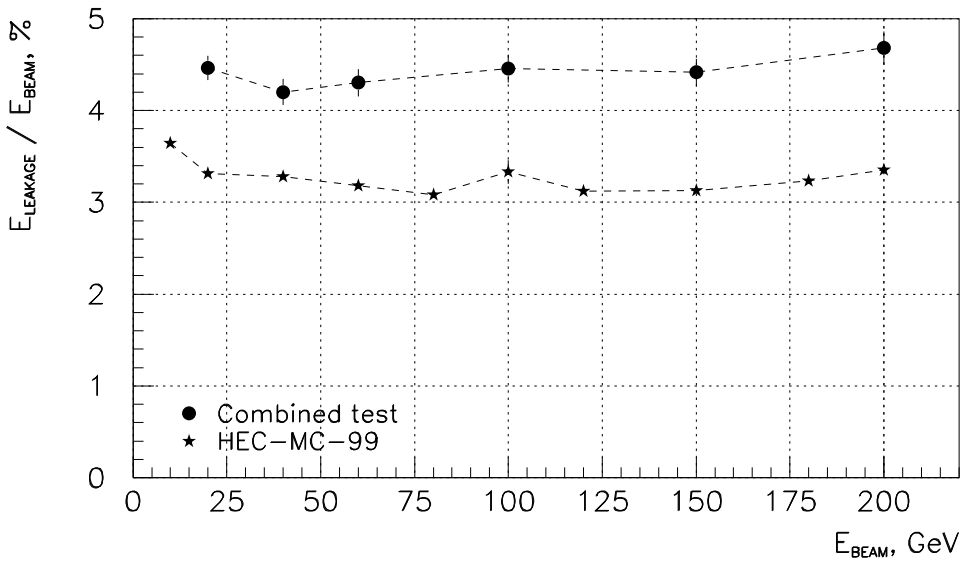


HEC-1

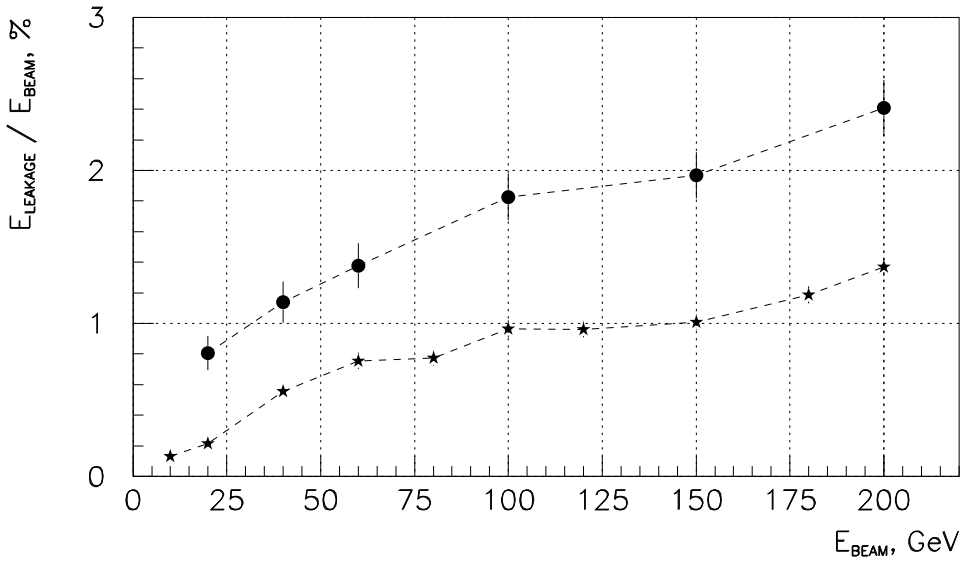


HEC-2

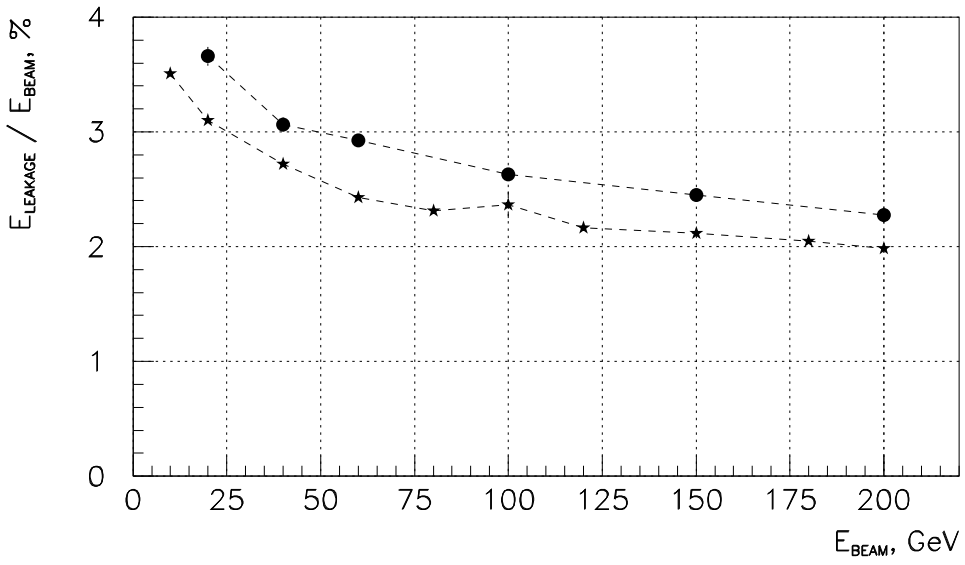
Leakage Energy for Pions



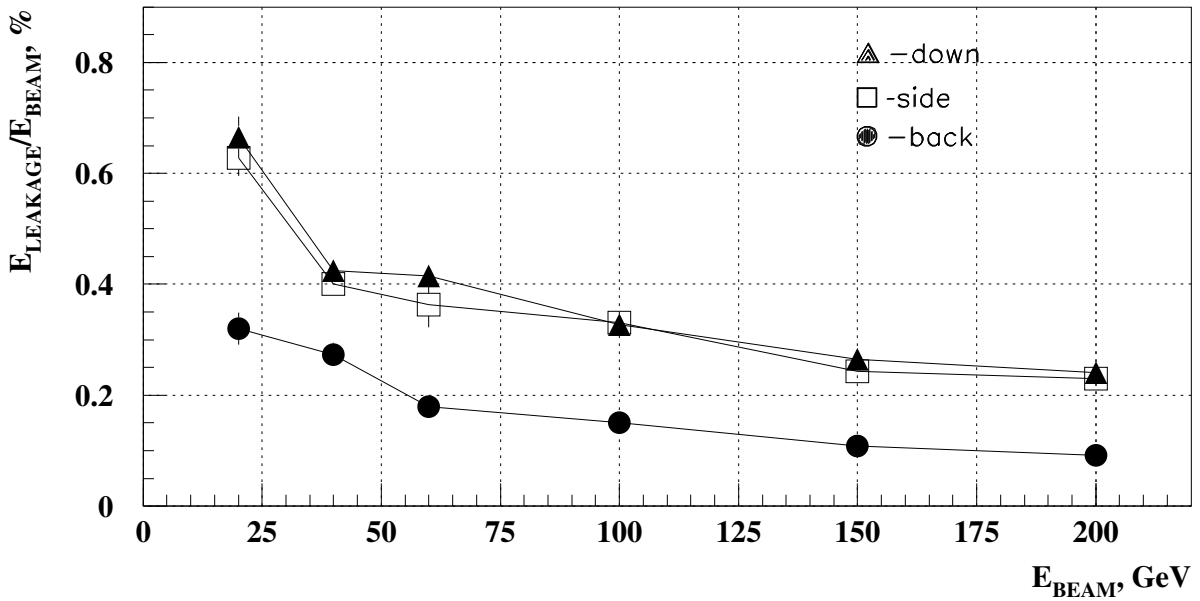
Total leakage



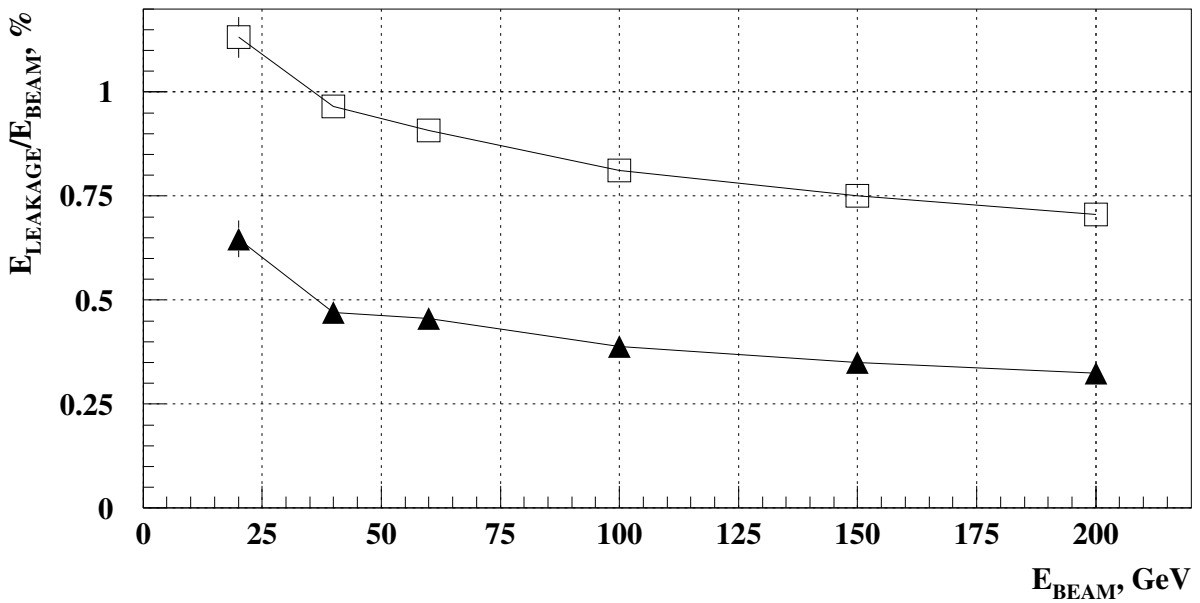
HEC-2 back leakage



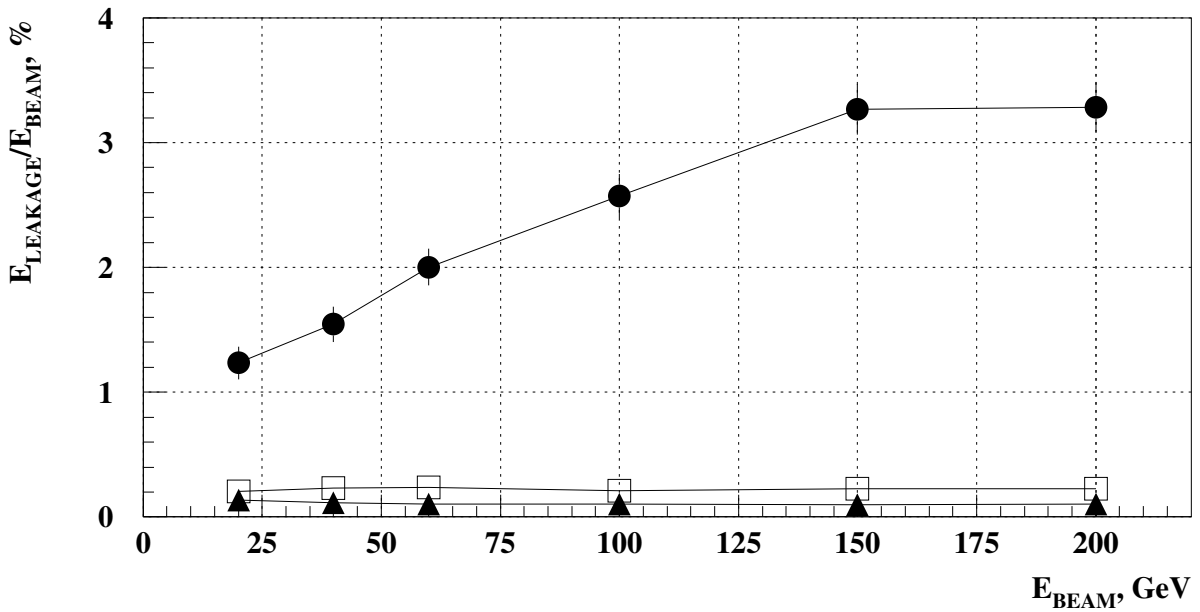
Remaining leakage



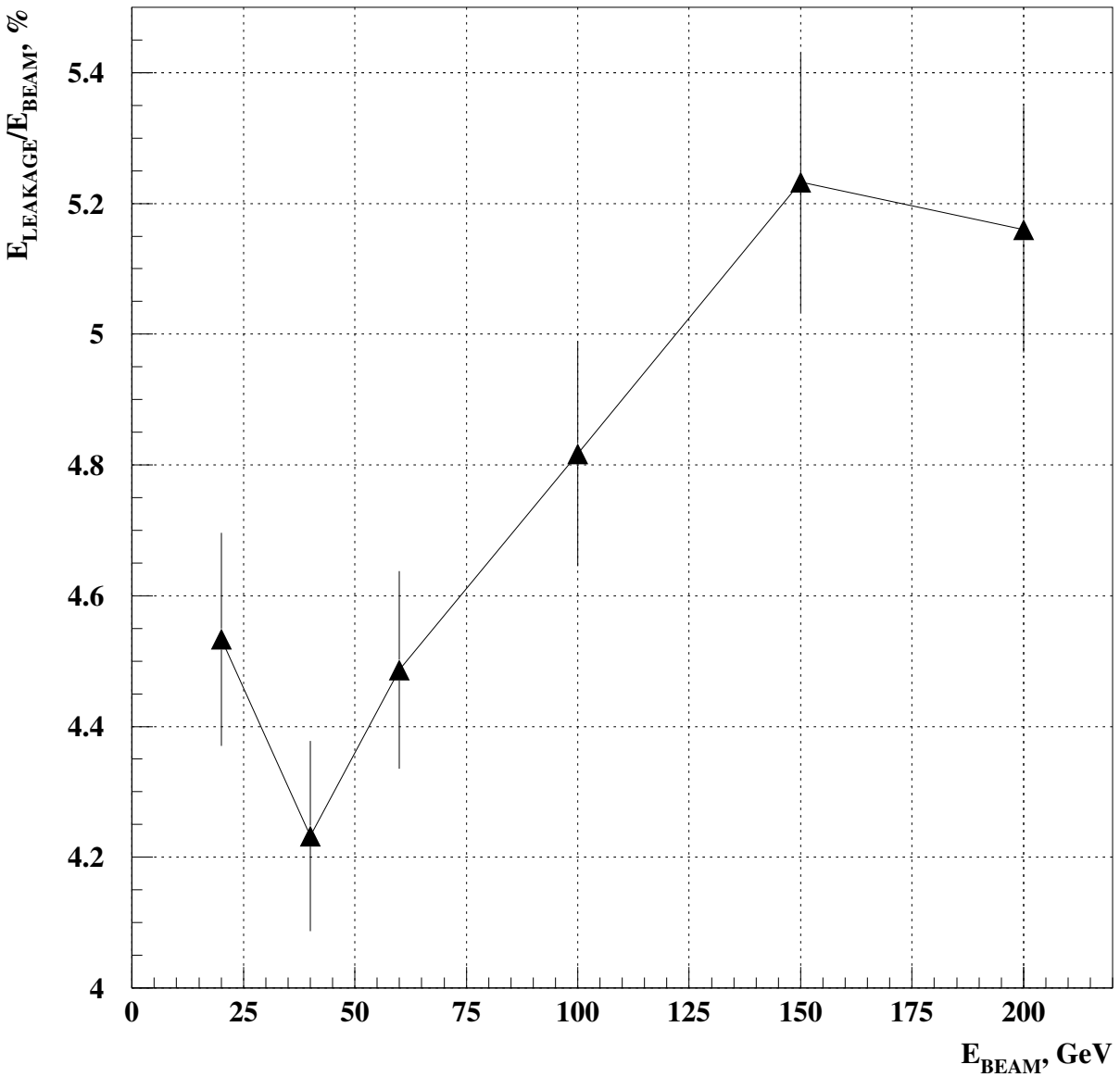
EMEC



HEC-1

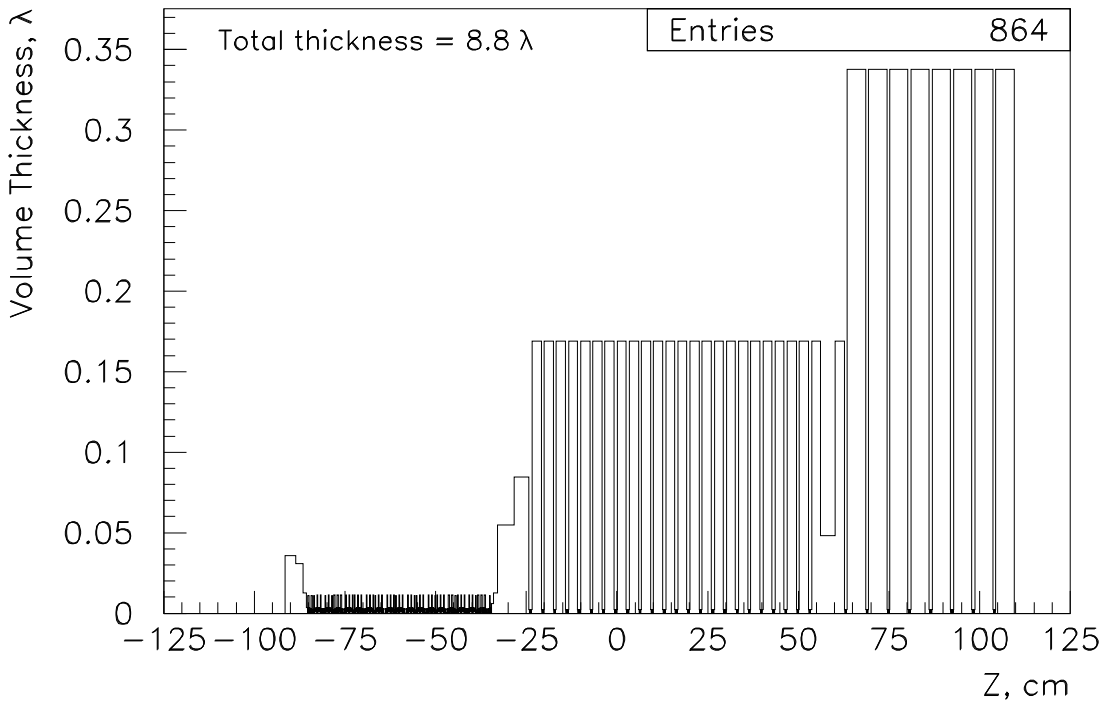


HEC-2

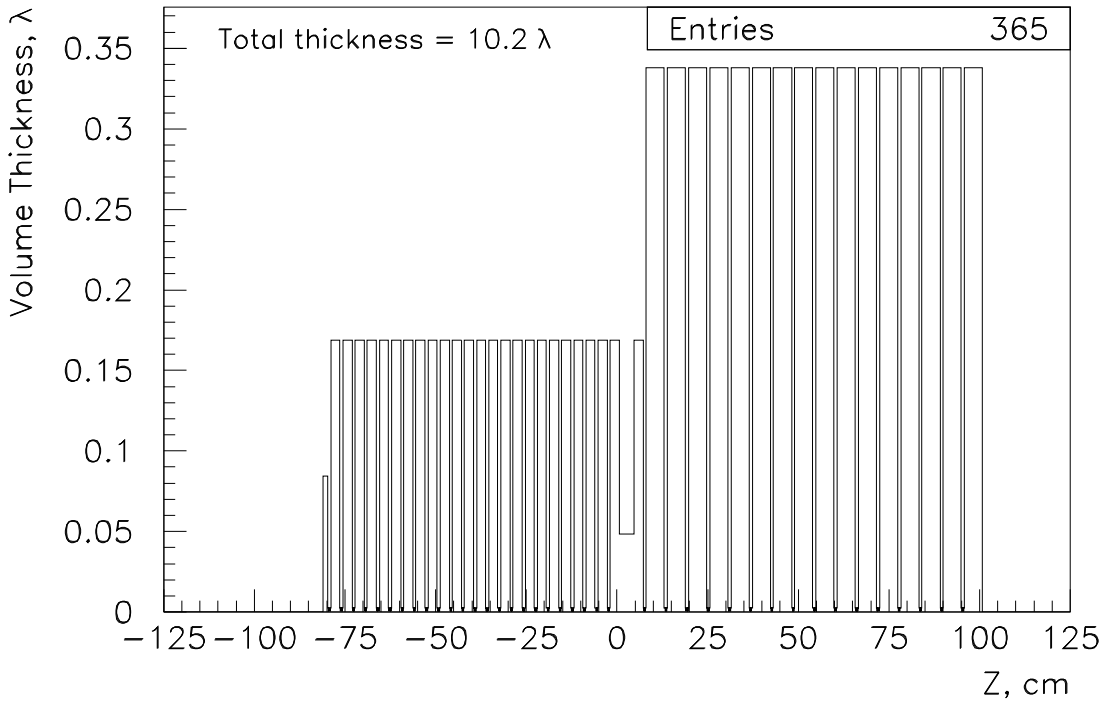


Total leakage

Thickness of Calorimeters in Absorption Lengths



Combined Test



HEC-MC-99

Evaluation of Performance

- **Comparison of charged pion simulations for:**
  - **combined test**
  - **ATLAS at η=2.45**
  - **HEC test beam 1999**
    (three full-length HEC modules)
- **Influence of the energy leakage**
- **Energy reconstruction**
  - **Whole calorimeter volume (no cone, no tower)**
  - **EM-scale calibration**
    - **HEC-1: C = 23.1 (from HEC-BEAM 3.0)**
    - **HEC-2: C = 46.2 (from HEC-BEAM 3.0)**
    - **EMEC: C = 11.3**
  - **Pion-energy-scale calibration**
    - **energy in the i^{th} event:**

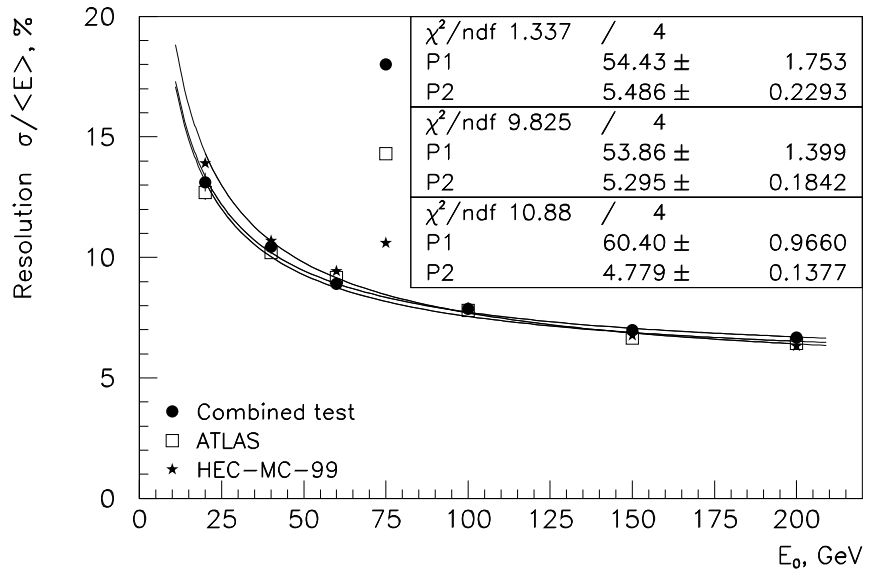
$$E_i = \sum_{j=1}^{2} C_j \cdot E_{ij},$$

E_{ij} — energy in the j^{th} part of the calorimeter in the i^{th} event,
C_j — pion "calibration" parameters,
two part/parameters: HEC and EMEC

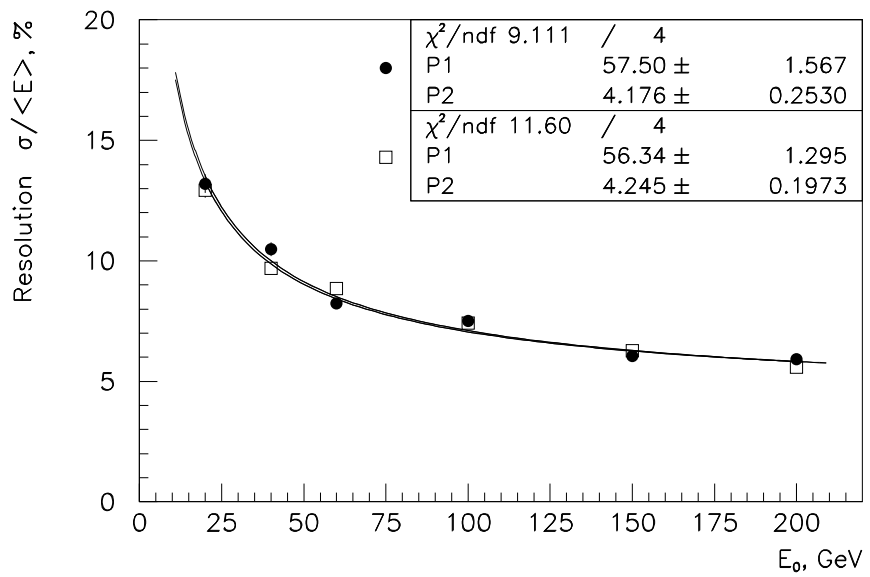
    - **Minimize functional**
      $F = \Sigma_{i=1}^{N}(E_i - E_{0i})^2$ **$\Rightarrow$** **C_{HEC} and C_{EMEC}**
- **Energy response**
- **Energy resolution**
  energy dependence of resolution:

$$\frac{\sigma}{E}(E_0) = \frac{P_1}{\sqrt{E_0}} \oplus P_2$$

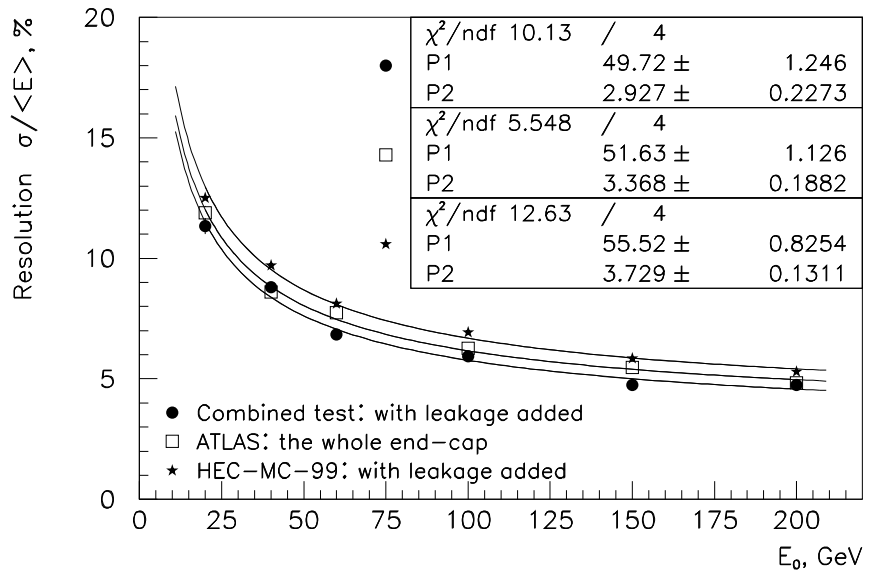
Resolution for Pions (GCALOR)



EM-scale calibration



Pion-energy-scale calibration



Leakage correction

Outlook

- EMEC: digitisation routine, energy calibration?
- Version 2 – missing: 2 gaps
- Output from MC – CW Ntuple
- Suggestions...???