ECAL for GEp/SBS

B. Wojtsekhowski

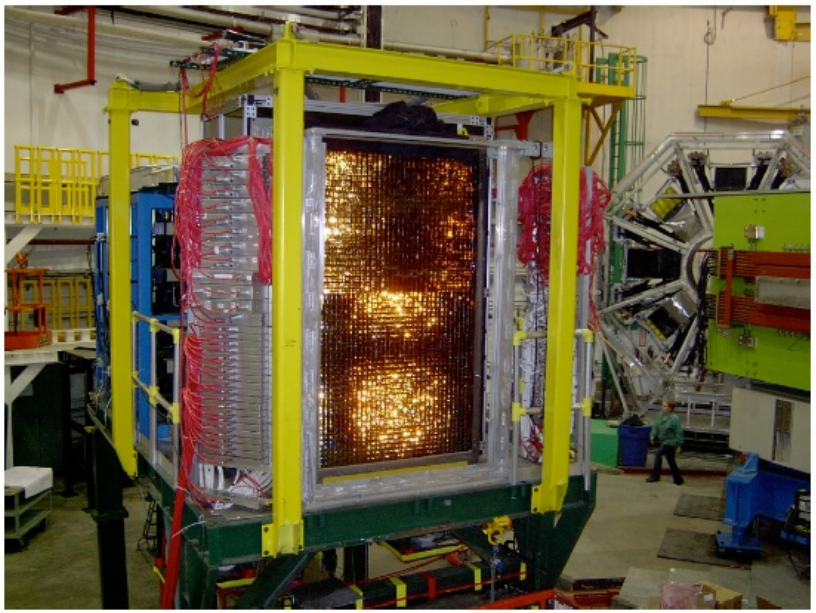
Electron Calorimeter for GEp

Performance Requirements

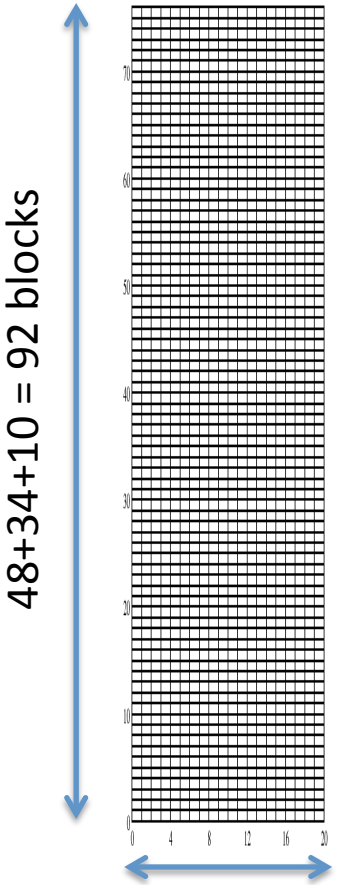
- Function: Detect 4 to 5 GeV Electrons
- Energy resolution: σ/E ~10% for 3.5 GeV electrons
- Spatial resolution: 6-8 mm
  (2 mm with upstream coordinate detector)
- Full luminosity: $8\ 10^{38}$ Hz/cm^2
- Trigger: Overlapping segments correlated with the proton
  Trigger at 75+% of elastic peak

BigCal for GEp experiment

Used in Hall C GEp3

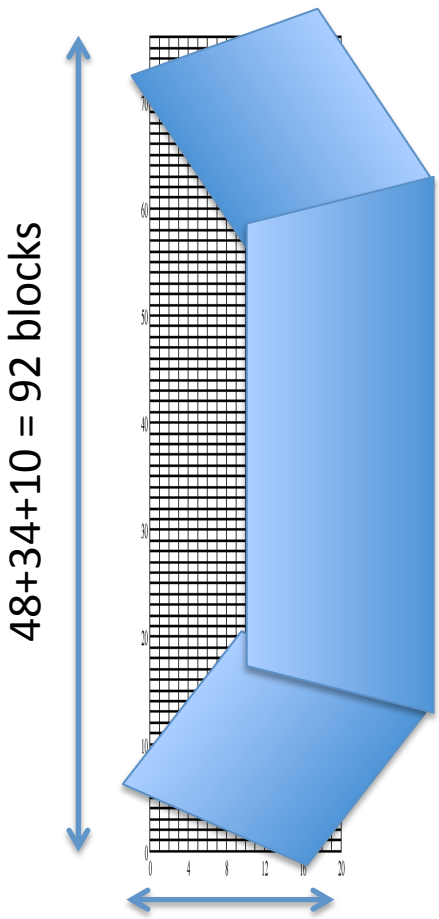


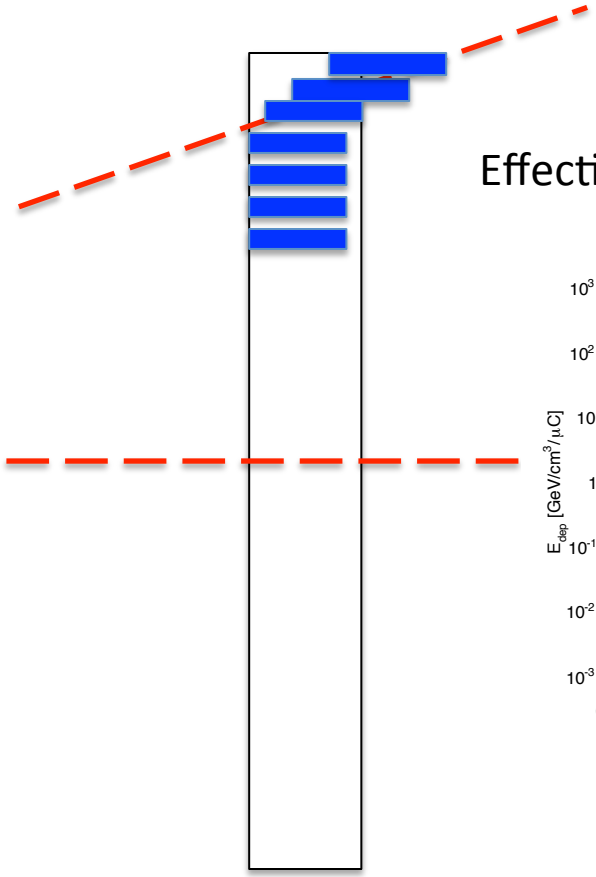
Reconfigure



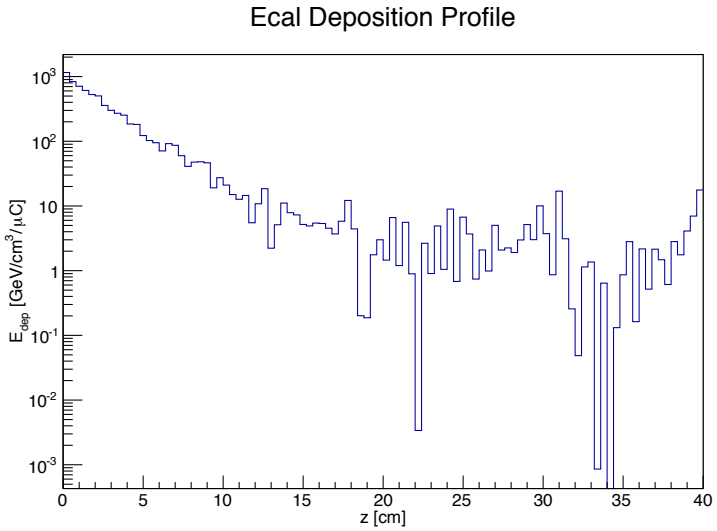
- ECAL-SBS
- Configuration: (960 + 714 + 220) = 1894 blocks
- Block size : 4.2x4.2x40, 4x4x40, and 3.8x3.8x45 cm^3
- Area: 0.84 m x (2.02+1.36+0.38) m = 3.75 m^2

BigCal for GEp experiment





Effective = 188 – 40 x 0.38 = 172 cm



Seamus's MC result for GEP:
0.5 kRad/hour (unprotected)

The items to do for ECAL

1. Components

i) Lead glass blocks
ii) PMTs
iii) HV bases
iv) Front-end electronics
v) Cables (signal and HV)
vi) HV supplies
vii) Fastbus system
viii) NIM electronics

There are a lot of progress

2. Thermal annealing

i) Measurement of the dark current
ii) Irradiation of 8 blocks/ISU and more/RadCon
iii) Optical bond technology
iv) Mechanical stability at 275 C (eff. 250 hours)
v) Annealing tests at 275, 250, 225, 200, 150 C
vi) C16 project
vii) Design of the 10% prototype (M200)
viii) Budget of M200
ix) Construction of M200
x) M200 test in Hall A in the fall of 2014

The milestones for ECAL (4/16/2014)

1. July 2014: Develop concept of annealing, float is 2 months
   i) Test
   ii) Design
   iii) Budget
2. May 2016: ECAL electronics is ready, float is 6 months
   i) Inventory
   ii) Design
   iii) Construction
   iv) Test
3. Sept. 2017: ECAL is ready for GEp run, float is 9 months
   A) Design
   B) Budget
   C) Construction
   D) Test

The milestones for ECAL 3/11/2015

1. July 2015: C16 resolution test, float is 4 months
   i) Design 2/15/2015 – completed
   ii) Construction 3/20/2015 – near completion
   iii) Test 4/30/2015 – if beam available
2. May 2016: ECAL electronics is ready, float is 6 months
   i) Inventory
   ii) Design
   iii) Construction
   iv) Test
3. Sept. 2017: ECAL is ready for GEp run, float is 9 months
   A) Design: stage 1 (C16 - BW); stage 2(C200 – SR); stage 3(ECAL-RW)
   B) Budget: RW/MJ/BW
   C) Construction: C200 at SBU in 2015-16; ECAL in JLab 2016-17
   D) Test in TestLab

The milestones for ECAL 3/11/2015

1. July 2015: C16 resolution test, float is 4 months

   i) Design 2/15/2015 – completed (BW)

   ii) Construction 3/20/2015 – (BW)
      a) heating regime - competed
      b) detector signals -completed
      c) cooling regime – under development

   iii) Beam Test 4/30/2015 – (MJ)
      a) platform at minimum angle
      b) cables for HV, signals, T-sensors
      c) Proton arm
      d) DAQ/analysis

The milestones for ECAL 3/11/2015

2) May 2016: ECAL electronics is ready, float is 6 months

i) Inventory: Front End; Long Cables; DAQ; HV: DAQ crates/SFI/ADC/TDC/HV crates/HV units
i) Design:
ii) Construction: in progress
iii) Test: ADC readout test in progress