CBC1 test beam 8th – 22nd October

CBC prototype + Infineon sensor

Infineon sensor provided by Vienna (Marko Dragicevic) 300 um thick, p-on-n 5cm long strips (256), 80 um pitch close to dimensions proposed for 2S-Pt modules AC coupled operated @ 300V bias (depletion @ ~240 V) ~200 nA total leakage





lab tests

CBC+sensor characterized in lab

CBC substrate temperature controlled to eliminate drift (20 deg. C) (pedestal drift ~ 2 mV / deg. C)

automated charge injection to all channels using on-chip capacitors signal generated externally – choice of 3 magnitudes (limited by circuit)



lab measurements

s-curves measured using test-pulse system only 3 amplitudes used noise and gain extracted from s-curves gain 47 mV / fC (assumes 20 fF Cinj) noise ~ 6.5 mV (870 electrons) response flat across channels no edge effects





lab measurements - beta source

count clusters in CBC for fixed number of scintillator triggers sweep comparator threshold in 5 mV steps -> raw data fit raw data with curve generated from Landau -> most probable signal value ~ 3.4 fC (21,000 e)





test beam system diagram



control and DAQ signal sequencing implemented in APVE FPGA board (also TDC functionality) allows to delay & synchronize CBC data with APV - so FED sees CBC data as if from an APV CBC data injected electrically into FED front end after optical receiver (before ADC) copy of CBC data sent to GLIB board

CBC1 test beam in 2011

CBC + sensor

beam tracking plane using APV

CBC + sensor operated parasitically in UA9 test

CERN H8 beam line September 2011



inside the box



measurement programme

2 week UA9 test period (parasitic operation) - 400 GeV protons

CBC+Infineon sensor system in operation throughout

global comparator threshold scans (can use to extract pulse height distribution)

520 -> 900 mV, 600k triggers / threshold setting (~ 0.75 -> ~ 9 fC)

data taken at 0, 10, 20, 30 deg. angle to beam

more data acquired at thresholds down to 510 mV (~0.55 fC, ~3000 e)

data analysis only just begun

CBC data successfully passed to and acquired by GLIB system









Mark Pesaresi



beam profile width - predicted vs. measured



predicted beam width = normal incidence beam width / $\cos \theta$

Mark Pesaresi

beam profile comparison with APV plane



Will Ferguson



Will Ferguson

summary

CBC + Infineon sensor test beam looks like a success so far

stable behaviour - lots of data to study in detail

cluster width, efficiency vs. threshold, ...

data transmitted successfully to GLIB based DAQ

can compare with results from 2xCBC2 module which will also use Infineon sensors

test beam personnel Mark R, Mark P, Jonathon, Davide, Will + GLIB team (Laurent +...)

SPARE

CBC1 test beam system Oct. 2012



hardware under construction

will use Infineon 256 channel sensors from Vienna (4 received - will bond 2) reading out ~ 128 good strips (avoid bad strips region)

will give point of comparison with 2xCBC substrates using same sensors