

ATLAS ZDC/Lumi monitor Integration

S. White
BNL

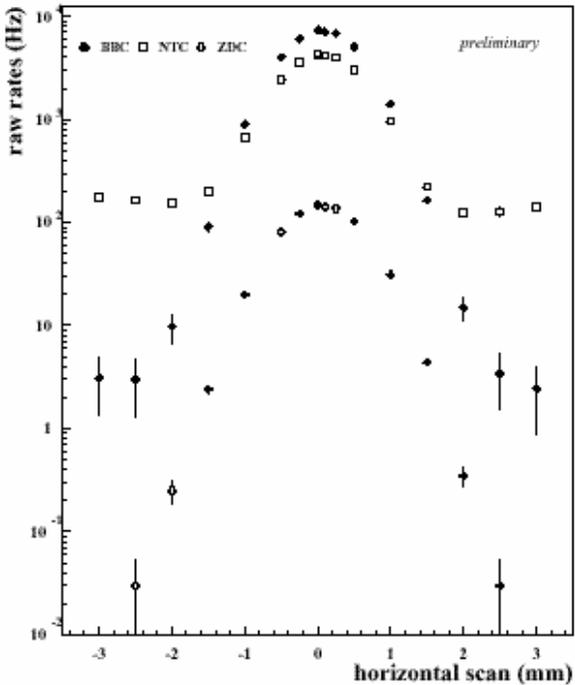
11 Nov. 2005

Outline

- Description of RHIC and ATLAS ZDC's
- Purpose of the RHIC test
- Plan for the Run

The Zero Degree Calorimeter (motivated by RHIC experience)

- Min. Bias Trigger and Absolute Lumi Meter for **Heavy Ions**
- Stable and Background-free relative Luminosity in **pp**
 - Over widest possible dynamic Range
 - Precise timing used for rf structure and crossing angle measurement
- LHC rates and Performance: CERN-AB-note-2005-030
- “provides for low luminosity LHC running an ideal system to understand performance of baseline ionization monitors”, H.S.
- ATLAS ZDC in initial construction Stage as BNL capital equipment project- 1st module in April ‘06
- RHIC ‘06 beam test planned jointly with LBL since 8/05

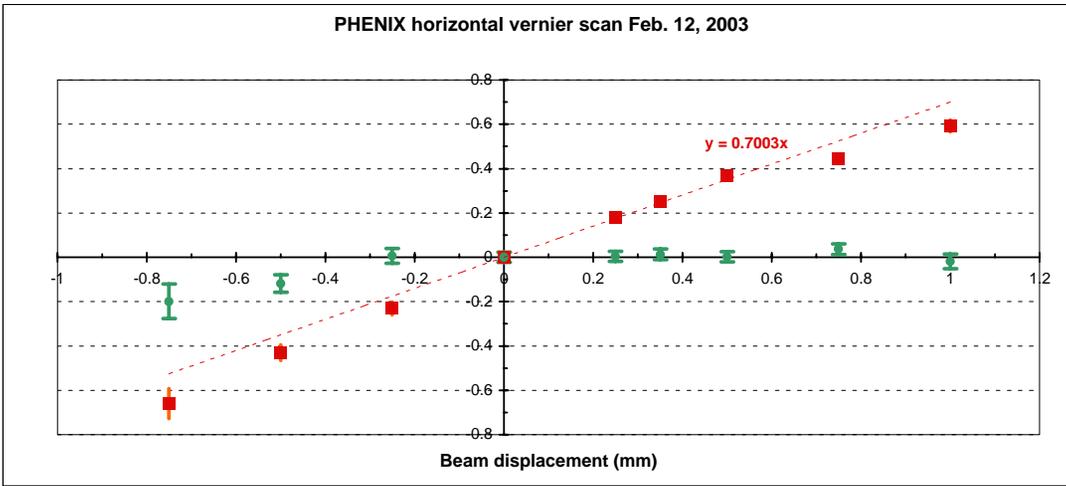
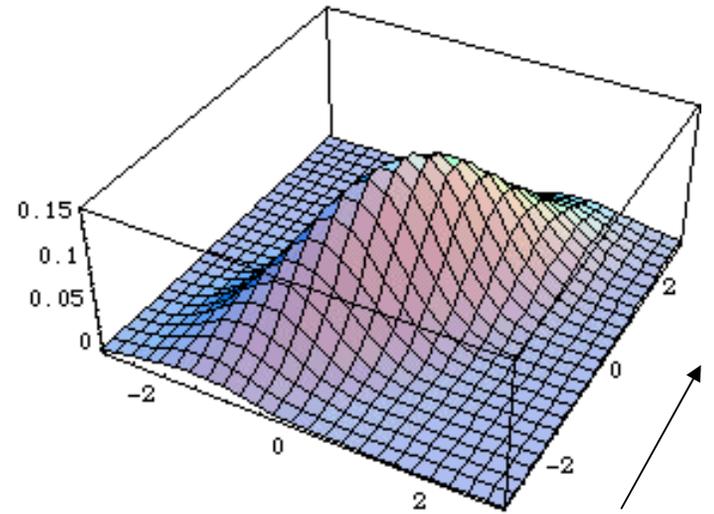


Accelerator application:
 vernier scan Rates for ZDC, BBC, NTC
 No background beyond accidental coinc.



Shower max detector pos'n vs. vernier

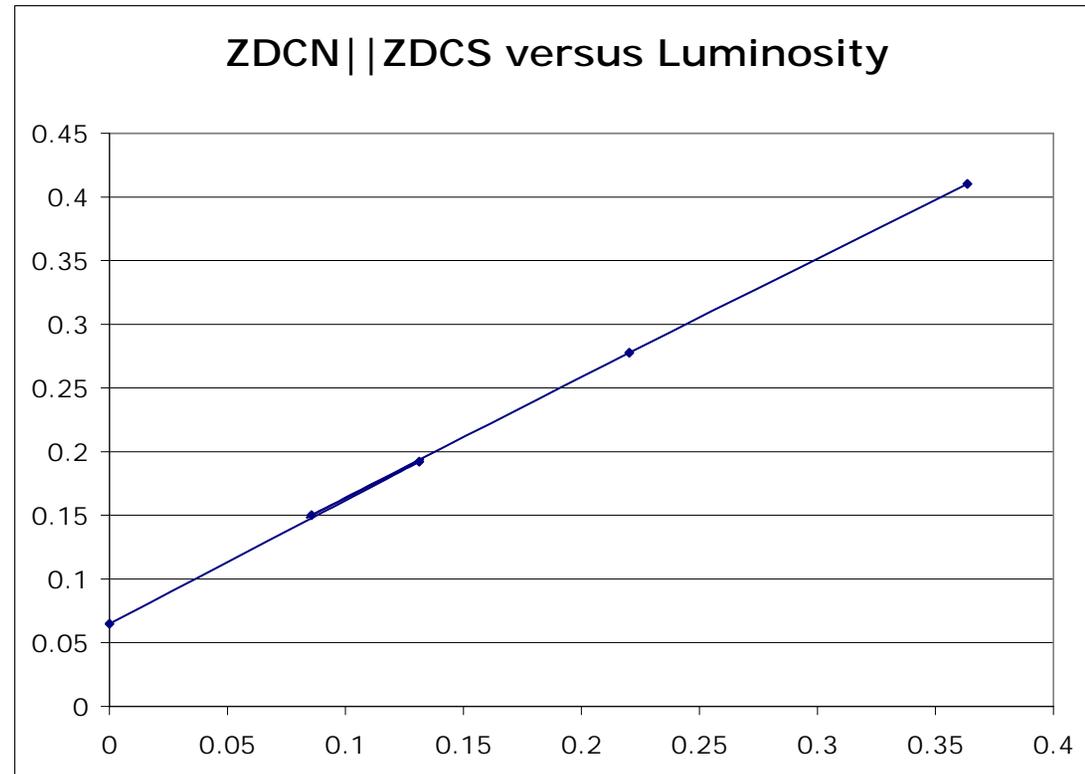
rate



Measured Beam
 x(mm)

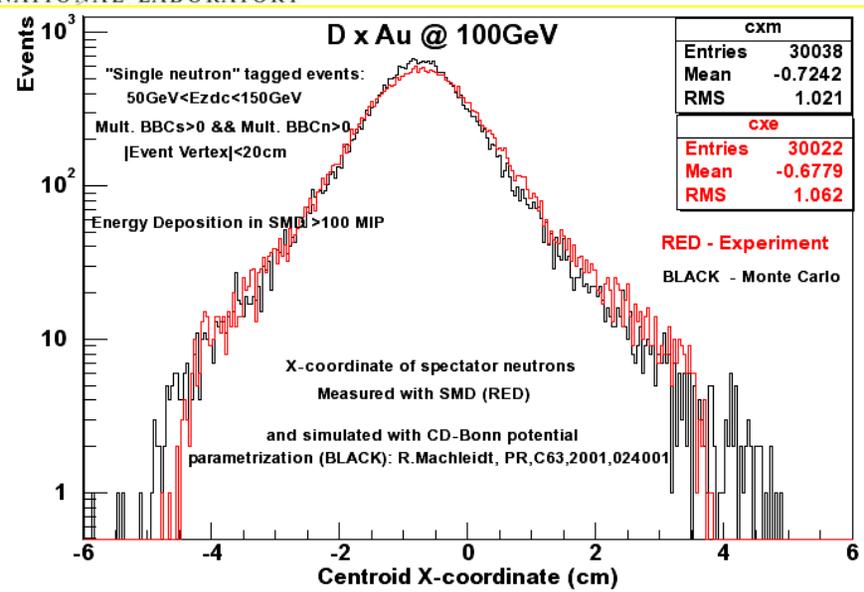
Vernier
 bump

Example from dAu
ZDC provides ref.
Singles like lumi rates



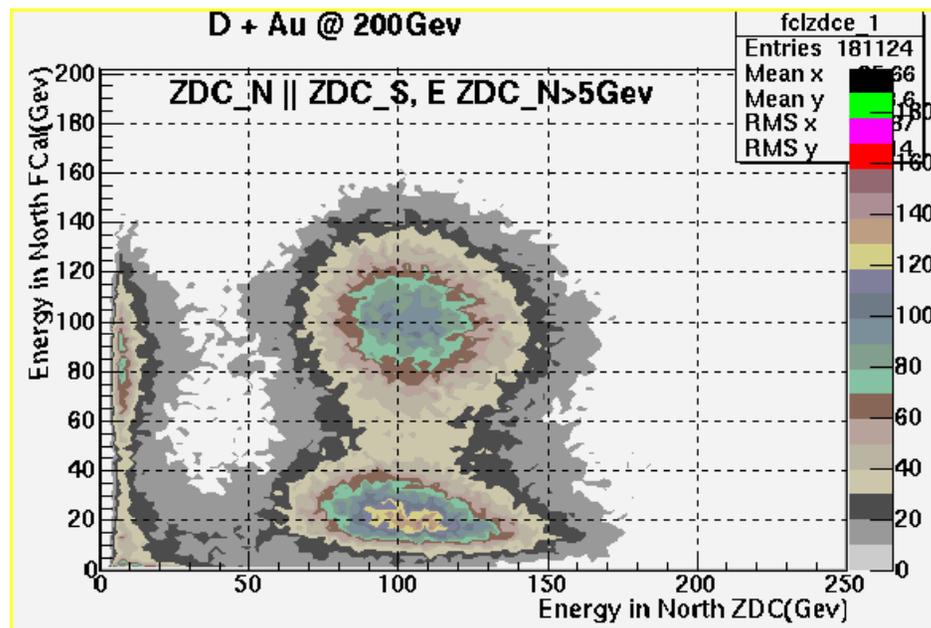
- Under optimal conditions singles are 5-10% background
- ZDC can be used to measure this

Example from d+Au analysis of deuteron dissociation



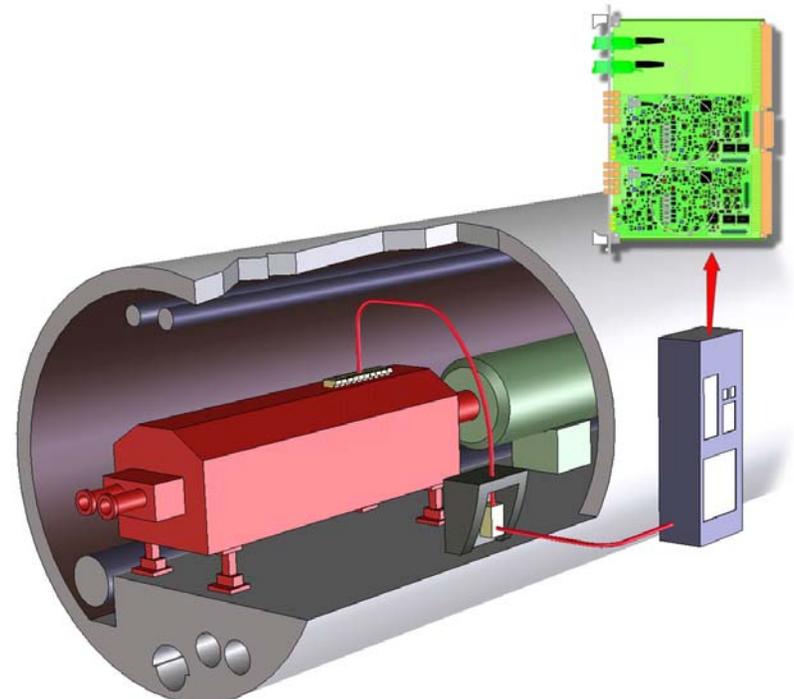
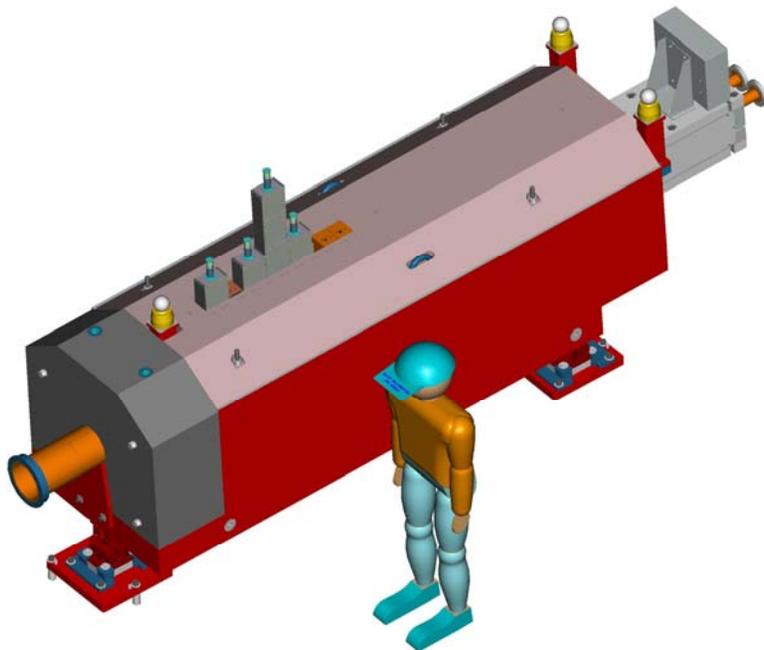
p_t^x measured from neutron
Impact in SMD

Clear signal for
d+Au-> n+p+Au
ZDC vs. fCal



Integration with Lumi chamber

Chamber after 1st module
Electrical services, handling coordinated with LARP



ZDC module design Completed

Driven by

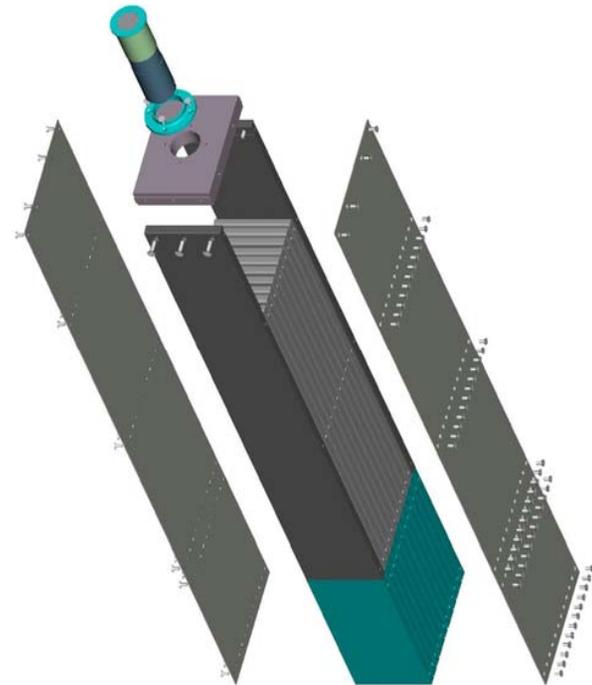
Rad hardness

TAN compatibility

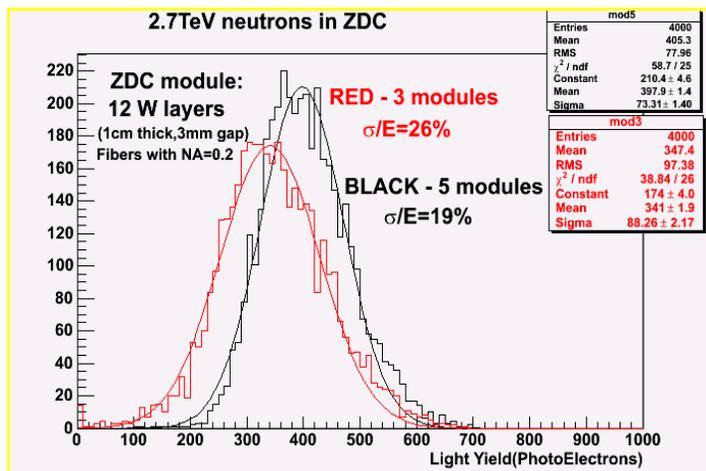
Tungsten/Quartz fiber

Fast mesh dynode PMT

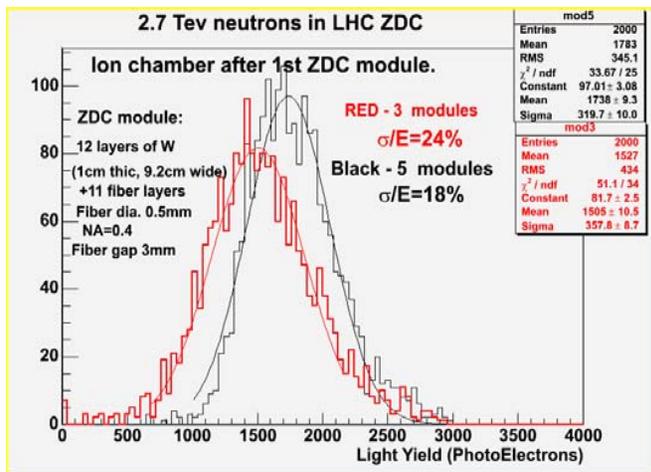
Construction started



Full response simulation with lumi



Response for si-si quartz fiber
(NA=0.2)

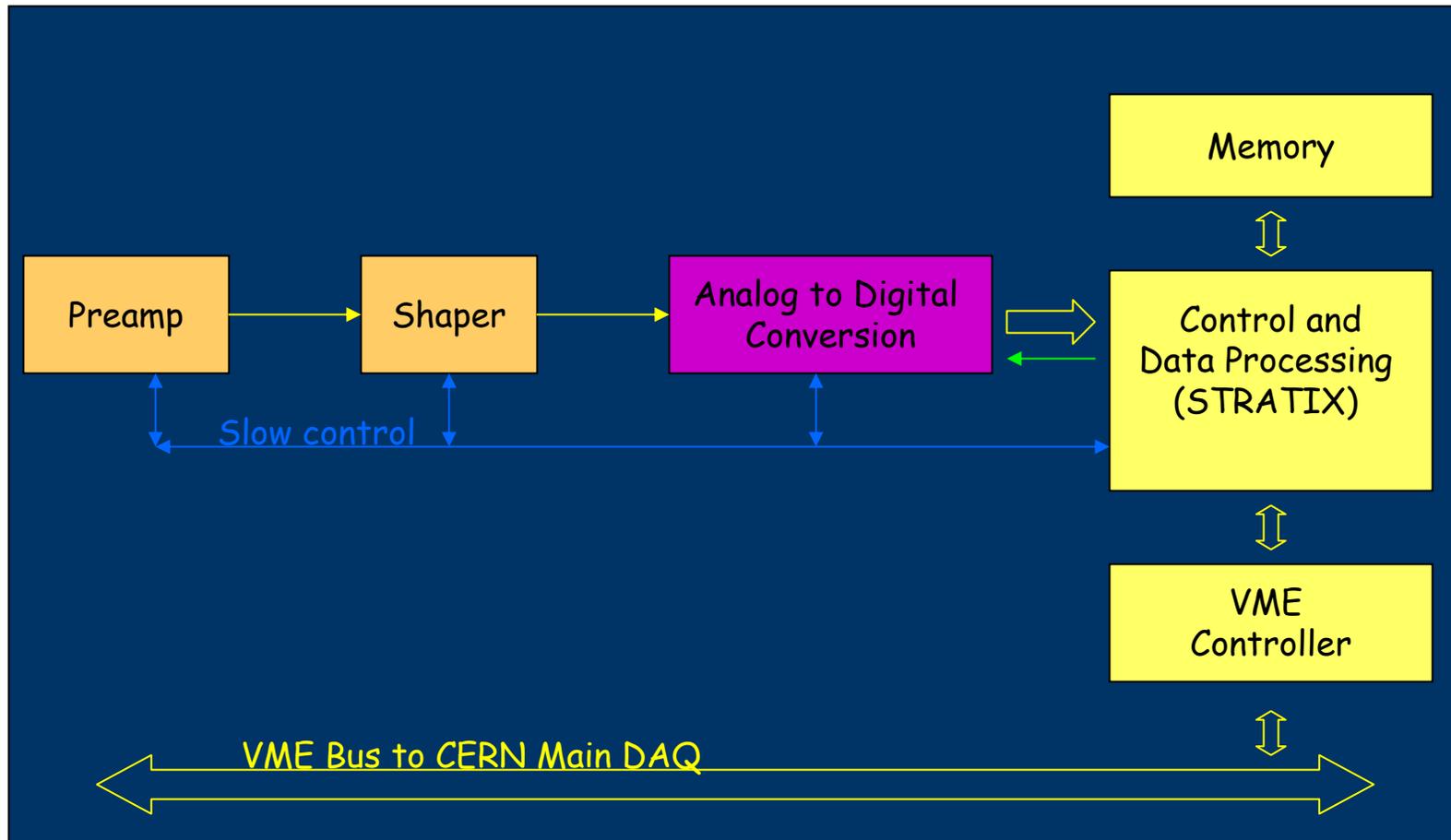


Same for hard-clad
(NA=0.4)

Purpose of the beam test at RHIC

- ZDC provides known reference for Lumi Chamber
 - rate and energy spectra known in pp (as in AA)(basis for signal and rate projections in Alex's table)
- High resolution measurement in same region as lumi mon
- Excellent Opportunity to test ZDC readout chain to be used in LHC
- Full system test while providing baseline ref. For Lumi Chamber

Readout Electronics Block diagram



Roadmap for Beam test

Ensure pre-existing ZDC functionality for MCR- diagnostics

Migrate ZDC amplitude readout to LBNL electronics (2 channels)

Install LHC version of PMT's

(Implement LBNL HPTDC solution)

Commission Lumi+ZDC integrated system with test pulsers and
luminosity

What We are delivering:

- ZDC signals for MCR use in tuning/diagnostics
- Baseline measurement for Lumi

What we request from RHIC:

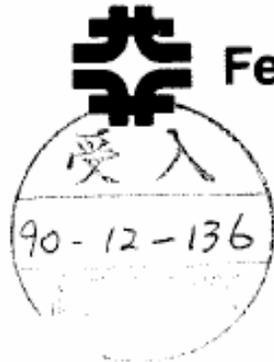
- Several stores in pp mode (identical to LBL lumi need)
- Room on platform to add Lumi chamber to ZDC setup

What we request from LBL:

- 2 channels of ADC readout LHC design
- Hopefully 1 channel TDC
- Assist in commissioning

Who are we?

S.White, A. Denisov , +{Yale team= G.Atoian,V. Issakov, M. Zeller}+LBNL team



CDF Luminosity Calibration *

The CDF Collaboration

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