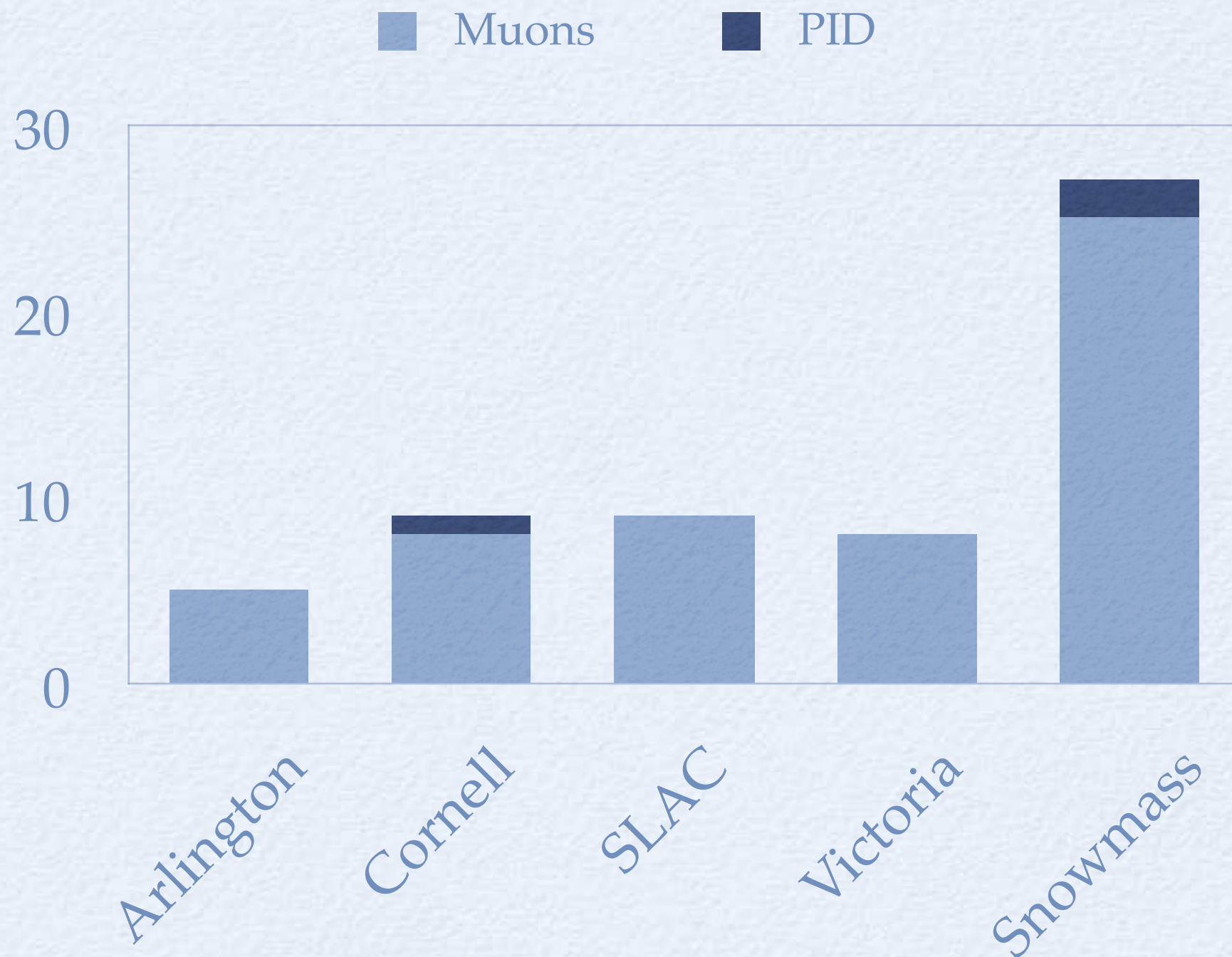


MUONS AND PID SESSION SUMMARY

Tohru Takeshita for Muons and Particle ID
Snowmass 2005

MUON/PID PROGRESS

within ALCPG



27 TALKS

R/D : 7

physics:3

PID : 2

other det. : 6

machine 2:

concept : 3

tool : 4

Gene Fisk	Fermilab	Introduction
Nicolai Mokhov	Fermilab	Beamline Muon Backgrounds
Marco Battaglia	UC Berkeley	Physics Requirements for ILC Muon Detector
Joseph Proulx	U. Colorado	Smuon & WW Studies
Ayres Freitas	Fermilab	SUSY & Other Models & Links to Cosmology
Caroline Milstene	Fermilab	Simulation Software Development
Jason Gray	U. Colorado	Tracking Low-Energy Muons
Mitch Wayne	Notre Dame	Strip Scintillator Muon Detector Prototype
Richard Smith	Fermilab	5T Solenoid, 5T Solenoid, Corr. Dipole, Fringe Field, Cost
Tohru Takeshita	Shinshu U.	GLD/Muon Sys Configuration
Marcello Piccolo	Frascati	LDC /Muon Sys Configuration
Gene Fisk	Fermilab	SiD/Muon Sys Configuration
Dmitri Denisov	Fermilab	Forward Muon System Configuration
Patrick LaDu	Saclay	DAQ Considerations

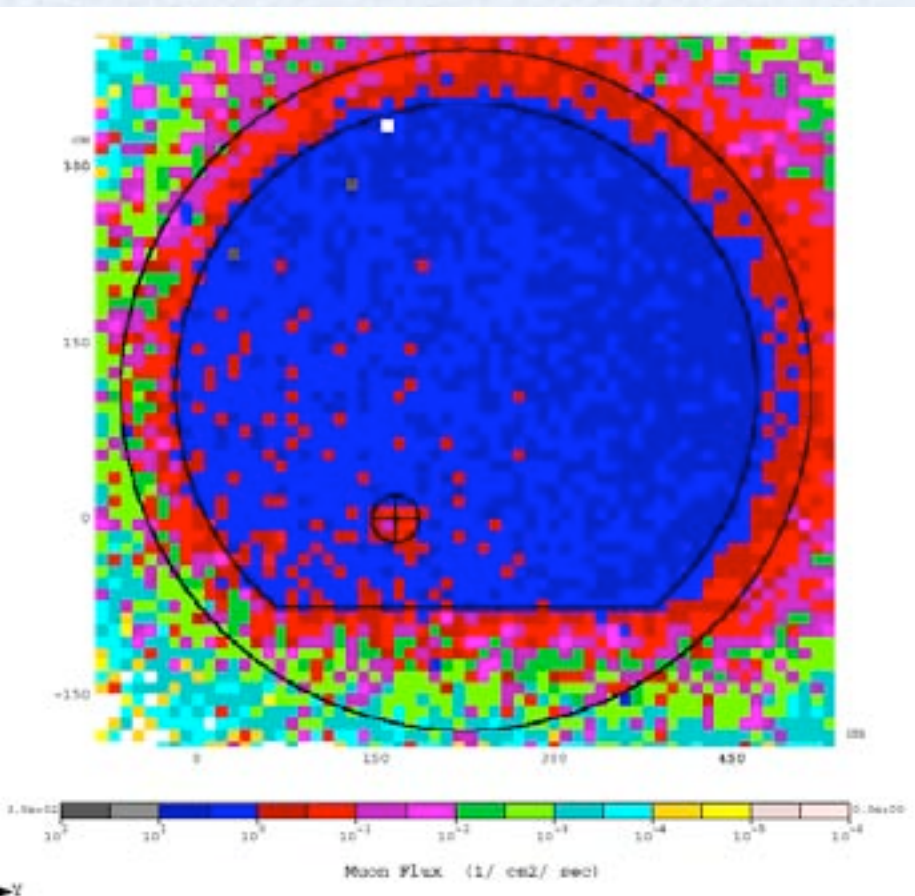
Dave Warner	Colo. State	Geiger Mode Avalanche Photo-diodes
Robert Wilson	Colo. State	Hadron ID w/ Cerenkov Light
Mark Oreglia	U. Chicago	Picosec TOF Detector & Electronics
Sanjay Swain	SLAC	BaBar Muon System & Upgrade
Mark Thomson	Cambridge U.	MINOS Muon Detection
Marcello Piccolo	Frascati	ILC Muon Sys RPC/Plastic Streamer Tubes
Tohru Takeshita	Shinshu U.	Asian Muon Sys R&D
Robert Abrams	Indiana Univ.	Muon Strip Scintillator Prototype Plane Tests
Mani Tripathi	UC Davis	Muon Strip Scint. Sys DAQ/Readout Pr
Dmitri Denisov	Fermilab	Wire Chamber Muon System
Robin Erbacher	UC Davis	CDF End-Plug Calorimeters
Gianluca Introzzi	Univ. & INFN Pavia	CDF Pre-Shower Upgrade

Chang-guo LU – RPCs at BELLE & BES-III

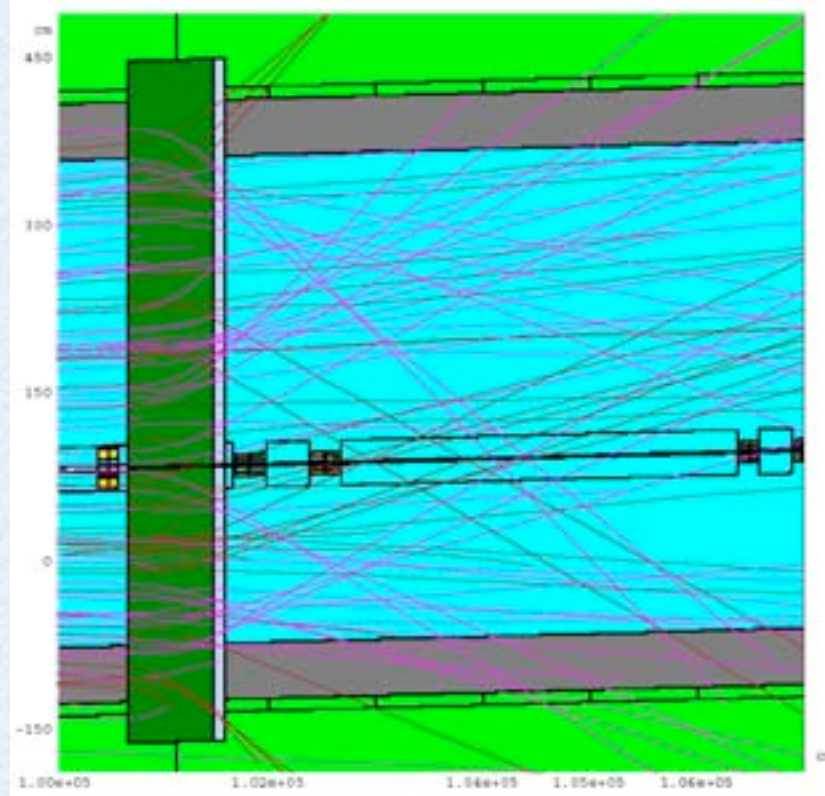
MACHINE IMPACT

- Beamline background muons : N. Mokhov

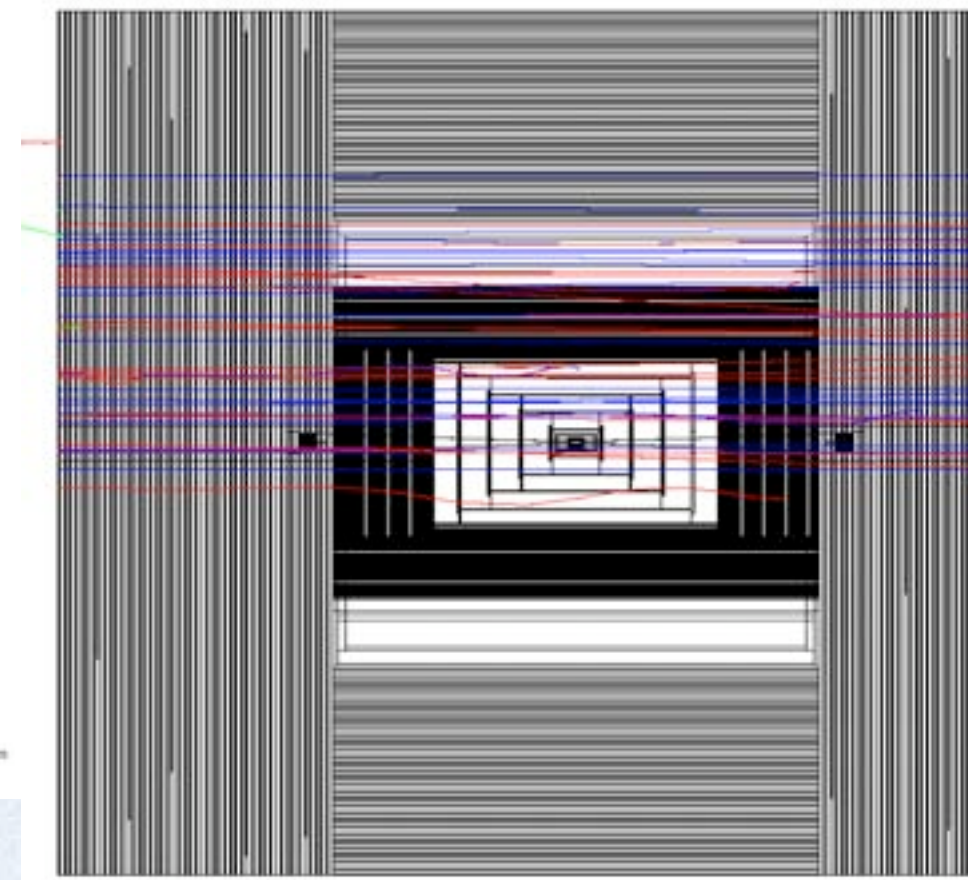
tunnel size



spoiler



detector



$$\langle E \rangle = 50 \text{ GeV}$$

$$4.1 / \text{cm}^2 / \text{s}$$

$$1.2 \times 10^{-3} / \text{cm} / \text{s}$$

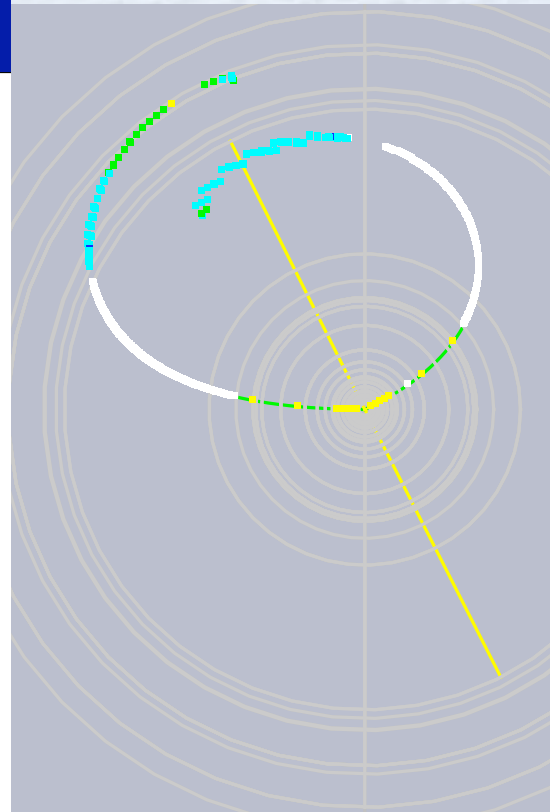
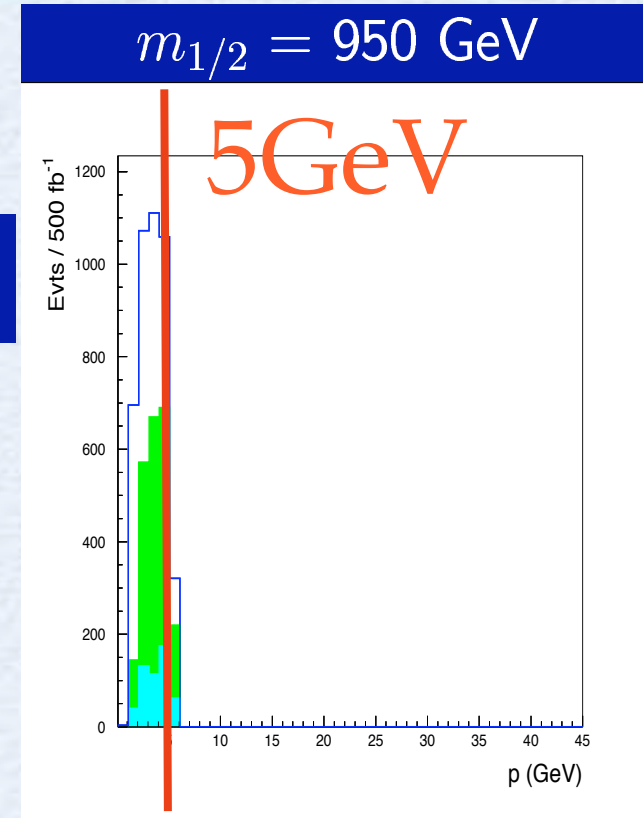
PHYSICS IMPACT AT MUON

- M.Battaglia : low P muon

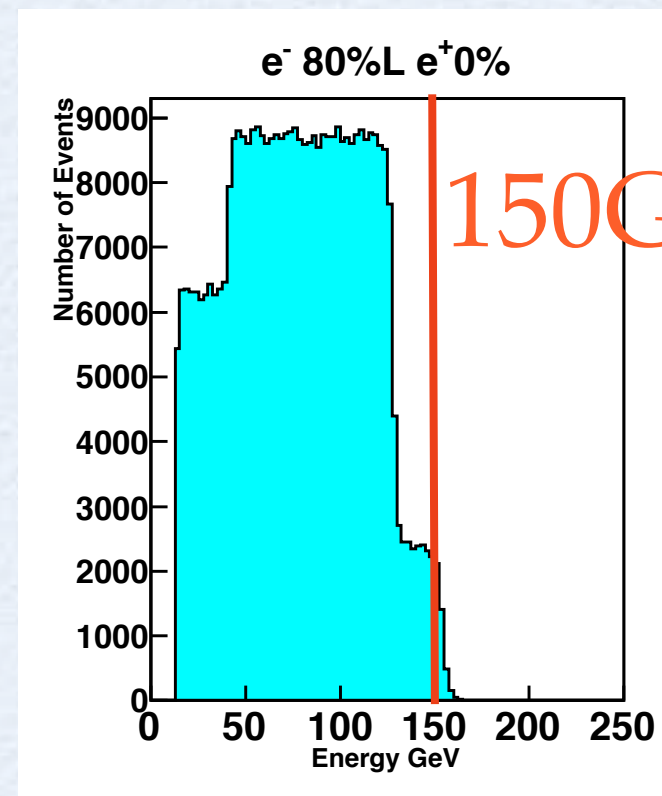
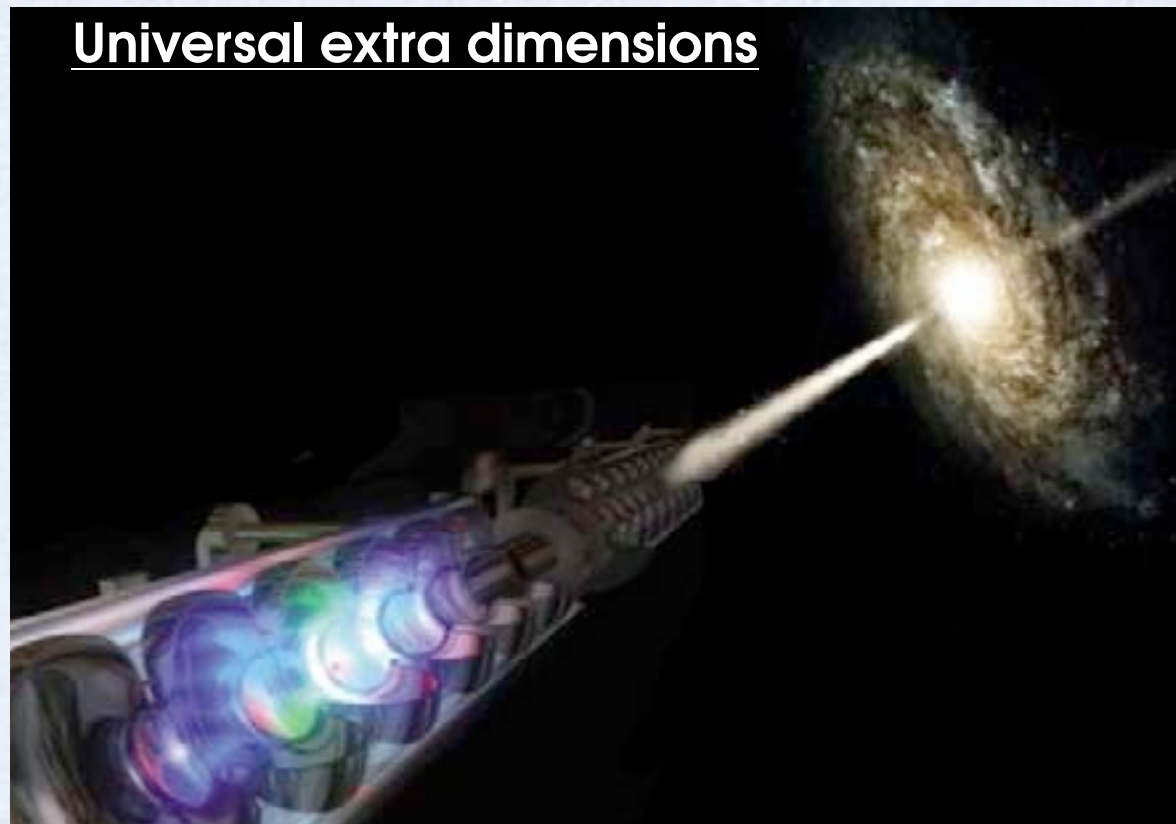
$$e^+e^- \rightarrow \tilde{\ell}_R^+ \tilde{\ell}_R^- \rightarrow \ell^+ \chi_1^0 \ell^- \chi_1^0 \text{ AT 1 TeV FOR } \tan \beta = 5$$

- J.Proulx : High P

- A.Freitas : universe



Universal extra dimensions



$$e^+e^- \rightarrow \tilde{\mu}_R^+ \tilde{\mu}_R^-$$

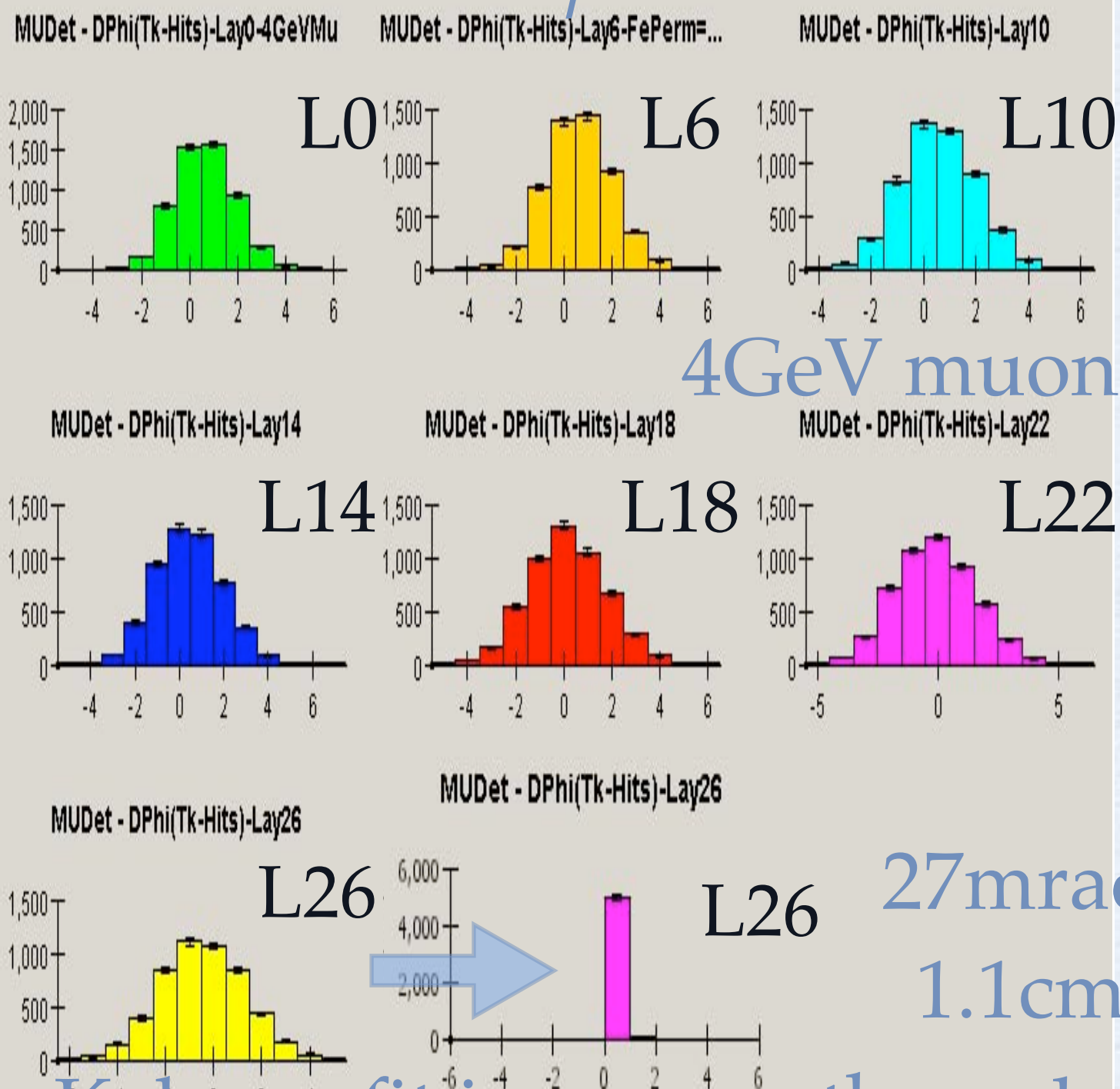
$$e^+e^- \rightarrow \tilde{\mu}_L^+ \tilde{\mu}_L^-$$

$$\tilde{\mu}^\pm \rightarrow \tilde{\chi}_1^0 \mu^\pm$$

MUON-SIM. IMPACT

- muon detector special resolutions : C.Milstene

$\Delta\phi$



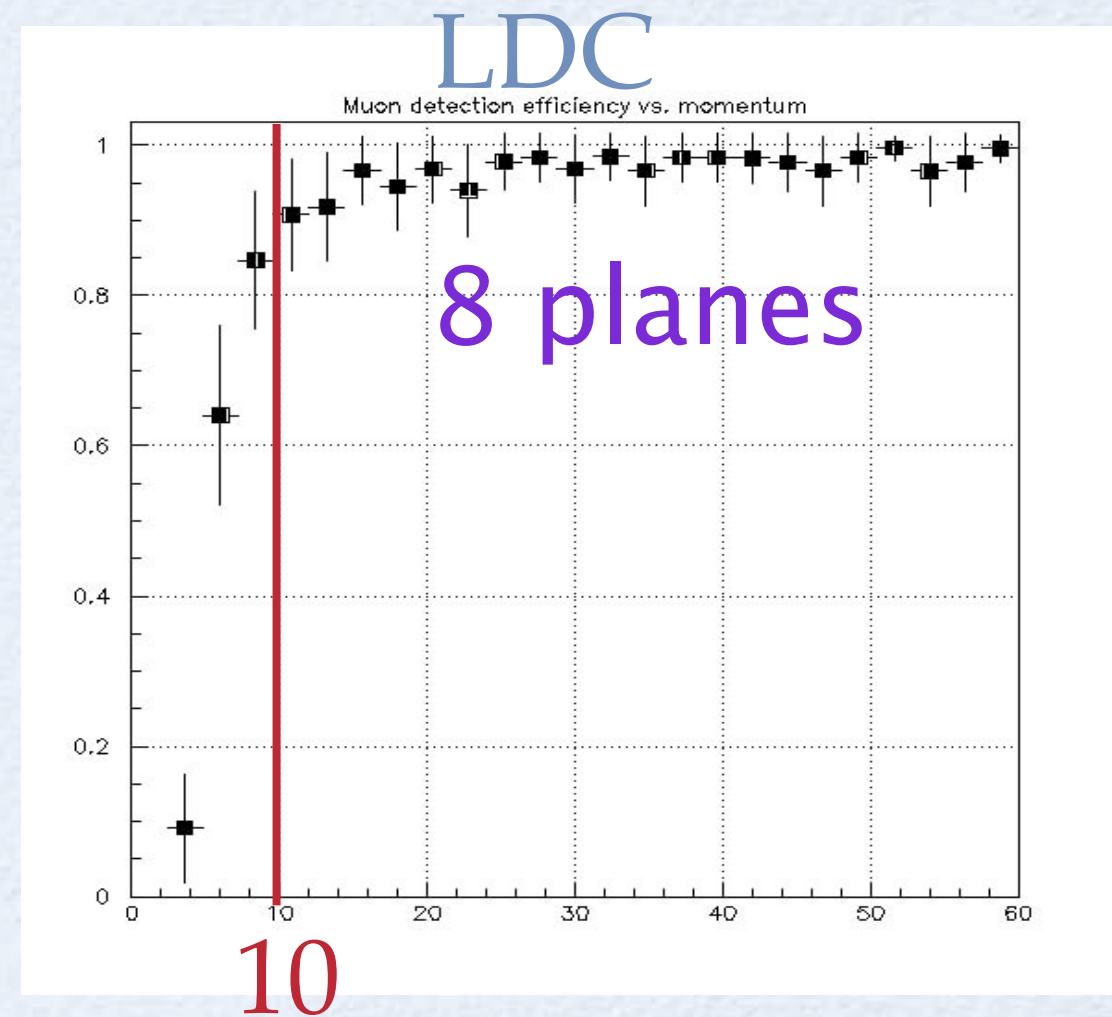
muon detection in jets

$p > 3\text{GeV}$	det / gen	eff.
muons	668 / 739	90%
pions	92 / 18029	0.5%
kaons	52 / 4301	1.2%

Kalman fit improves them drastically refer to muon session

THREE CONCEPTS IMPACT

concept	detector	N of layers	B field
SiD	scinti-strip	12	5T
LCD	RPC	8,10	4T
GLD	scinti-bar	5	3T



How to combine HCAL?

single muon momentum

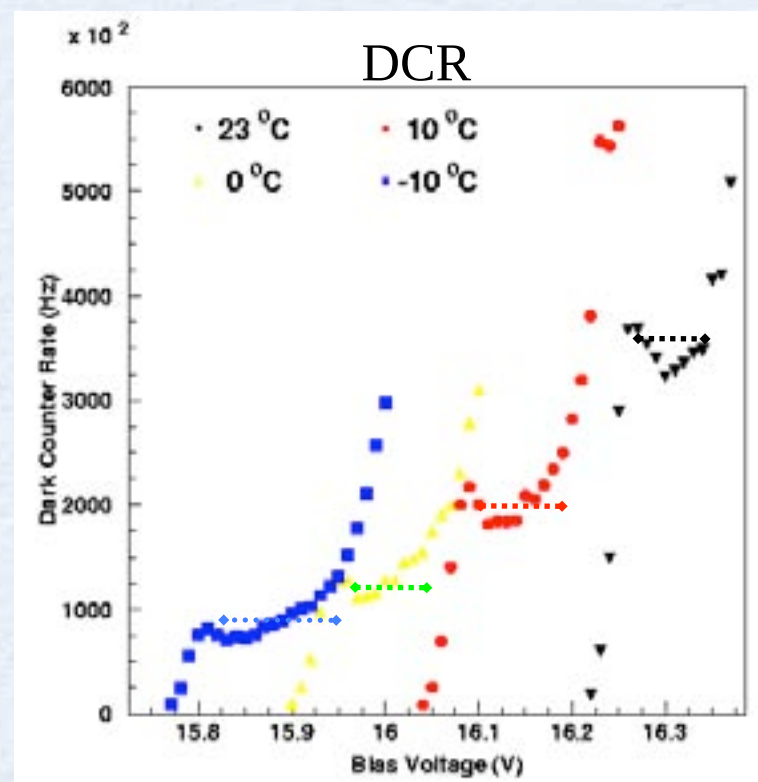
DETECTOR R/D IMPACT

- Photon sensor R/D
- Geiger Mode APD : R. Willson

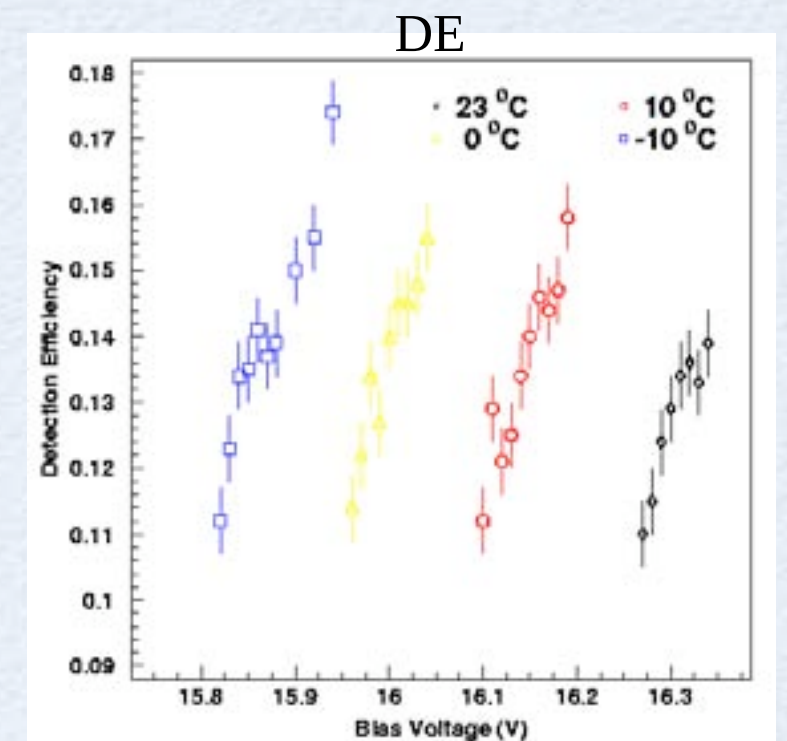
$162\mu\text{m}$ single pixel $V_{\text{bias}} \sim 16\text{V}$



8ch active
quenching
circuit



- Temperature dependence of GPD operating bias voltage $\approx 0.013\text{ V}/^\circ\text{C}$
- Operating plateau width $\approx 0.100\text{ V}$

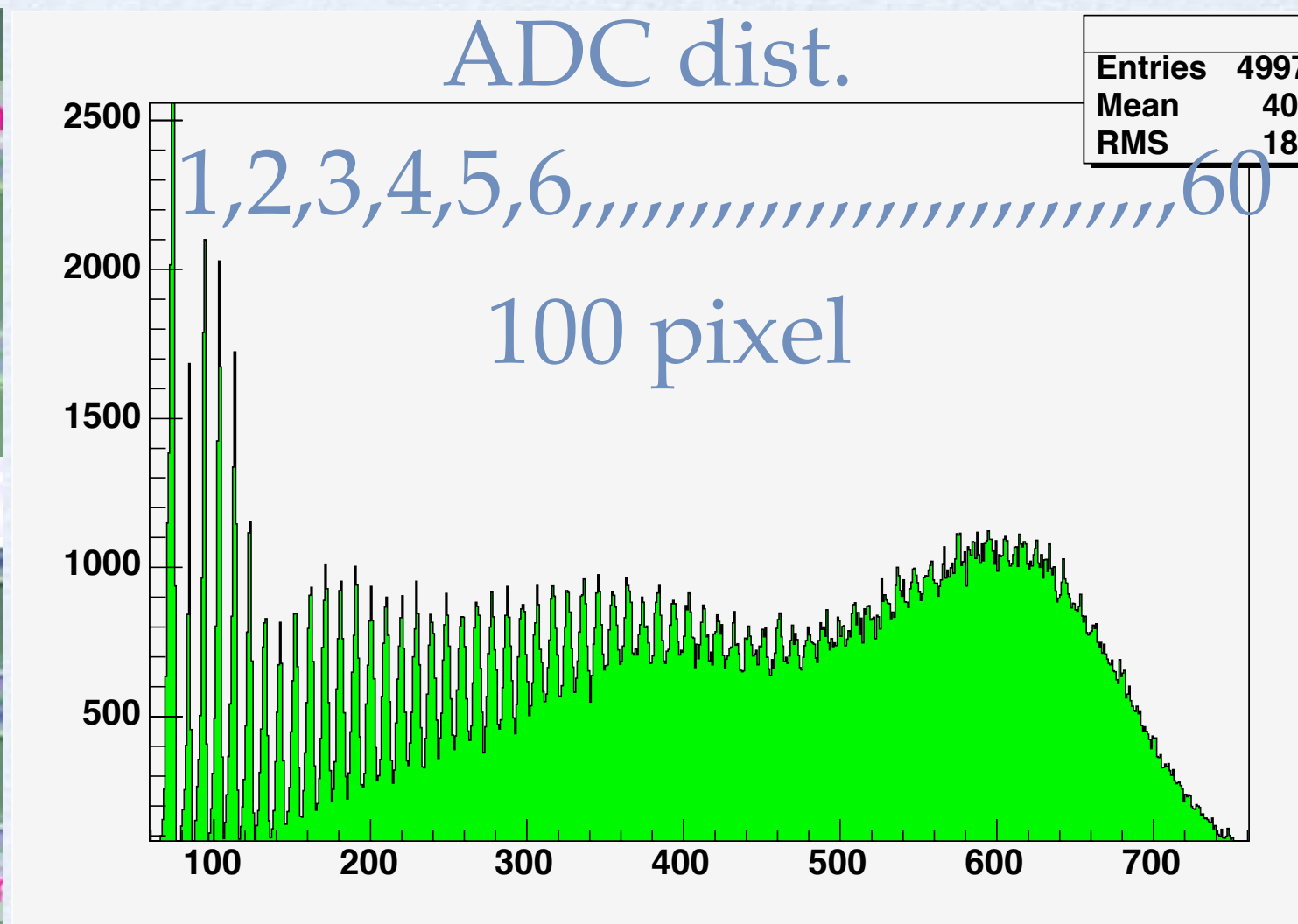
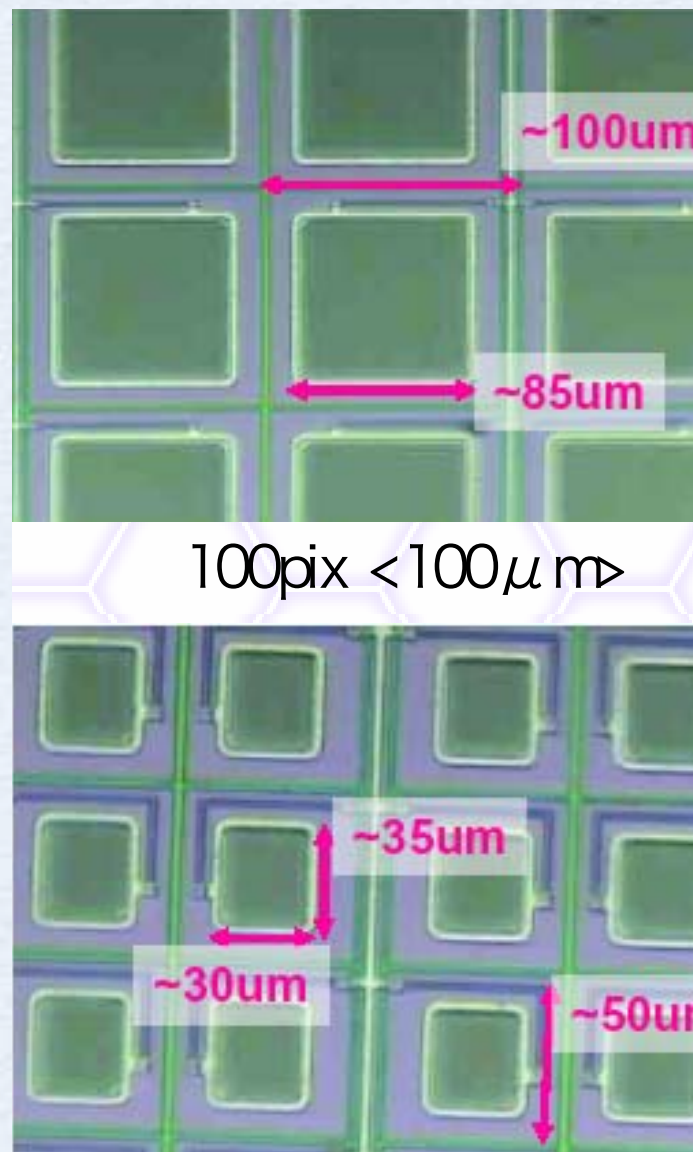
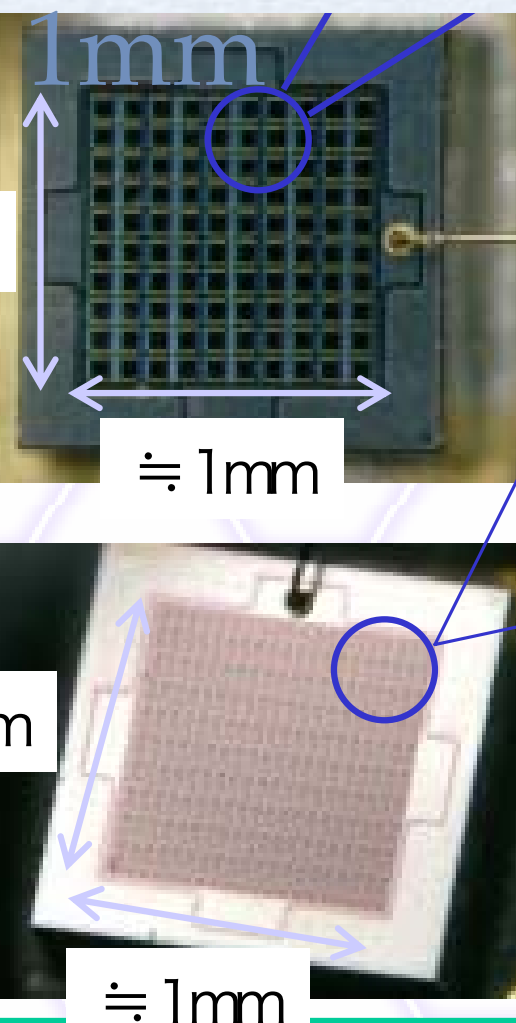
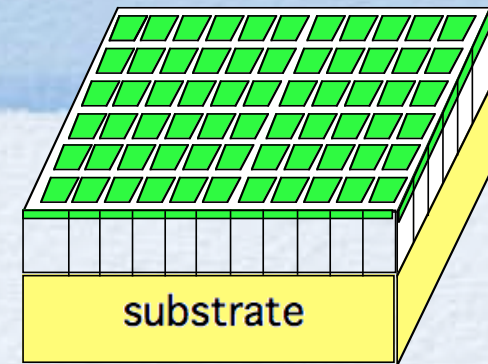


- GPD coupled to 60 cm length of Y-11 fiber
- Excited by LED flasher set for 1 CR-equivalent

64ch GPD from aPeak

DETECTOR R/D IMPACT CONT

- Photon sensor R/D
- Multipixel Photon Counter : T.Takeshita



DETECTOR R/D IMPACT CONT.

- scintillator bar production

relative light yield



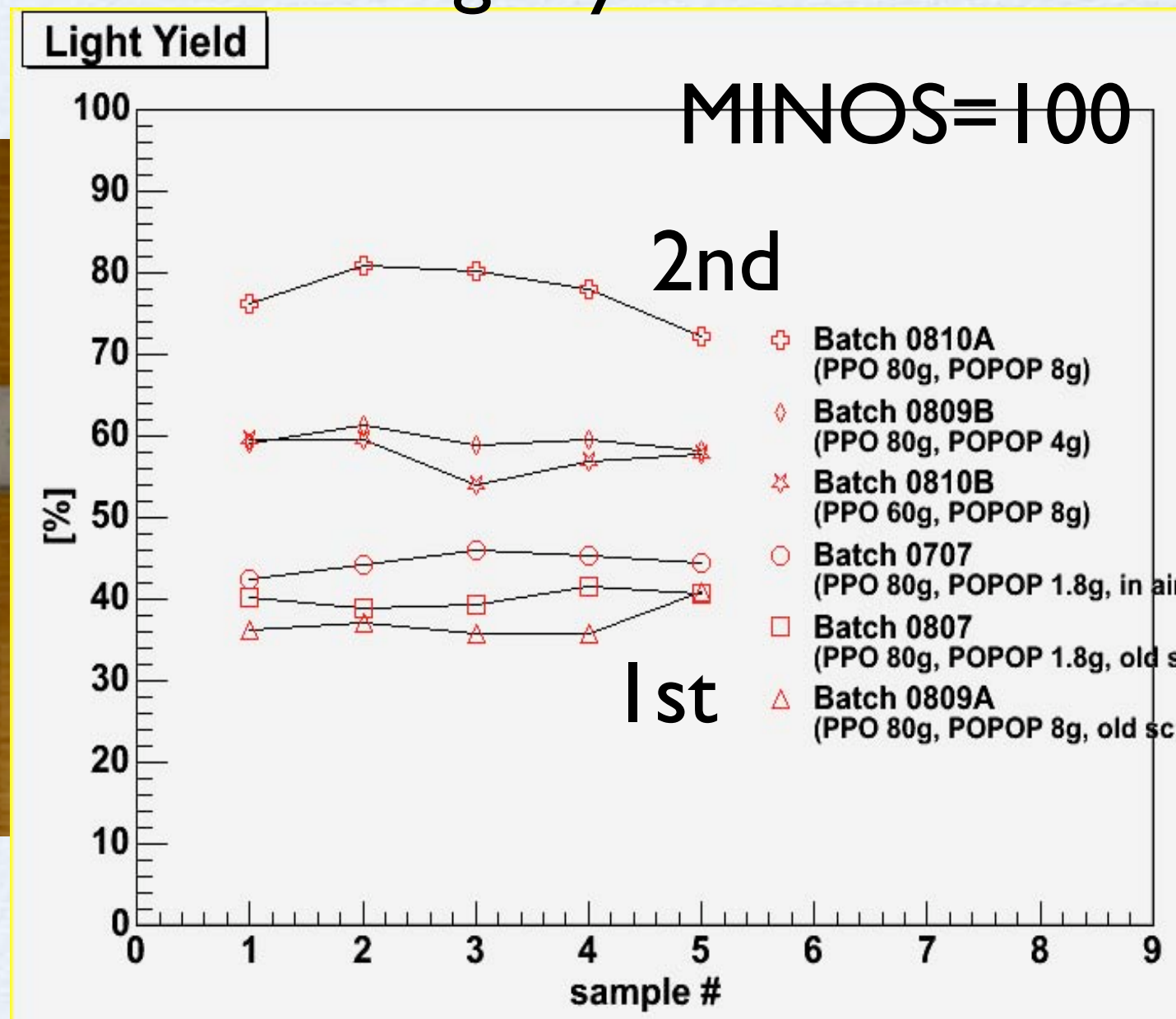
no dopant

2nd batch

MINOS

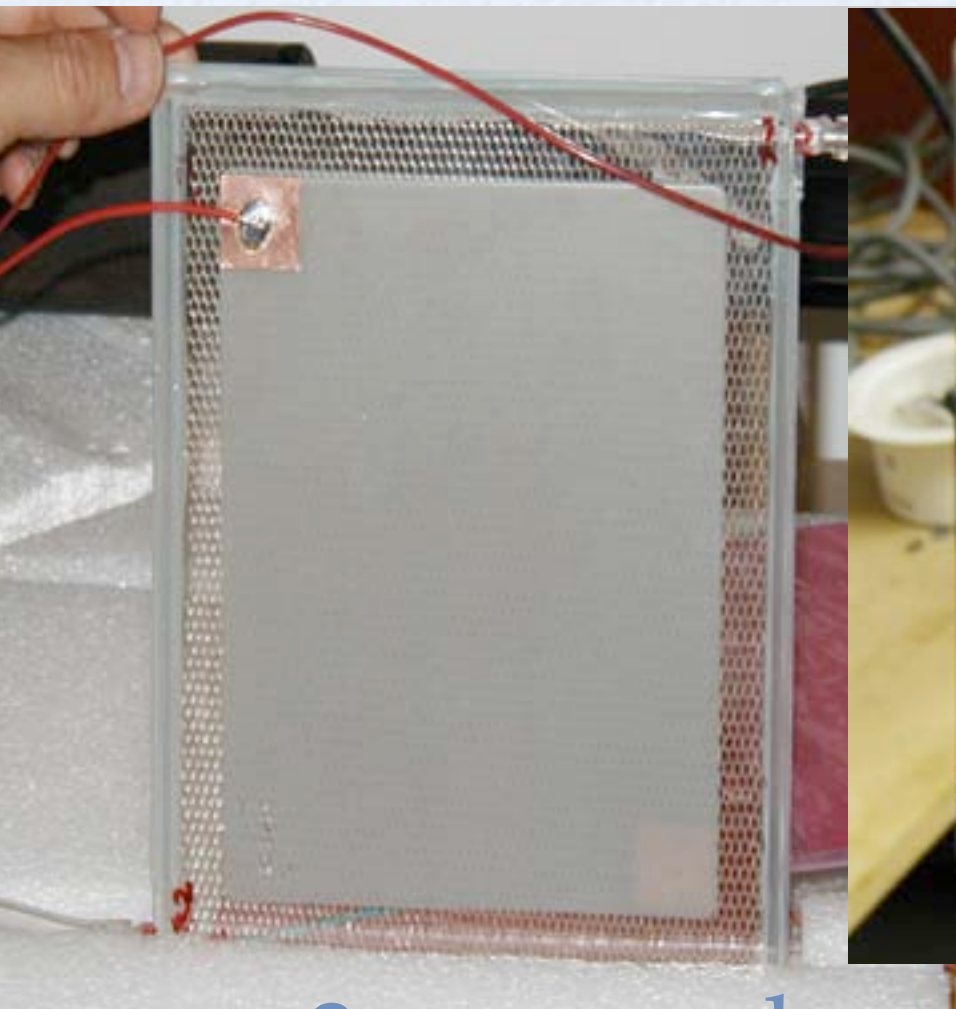
1st batch

expect more light

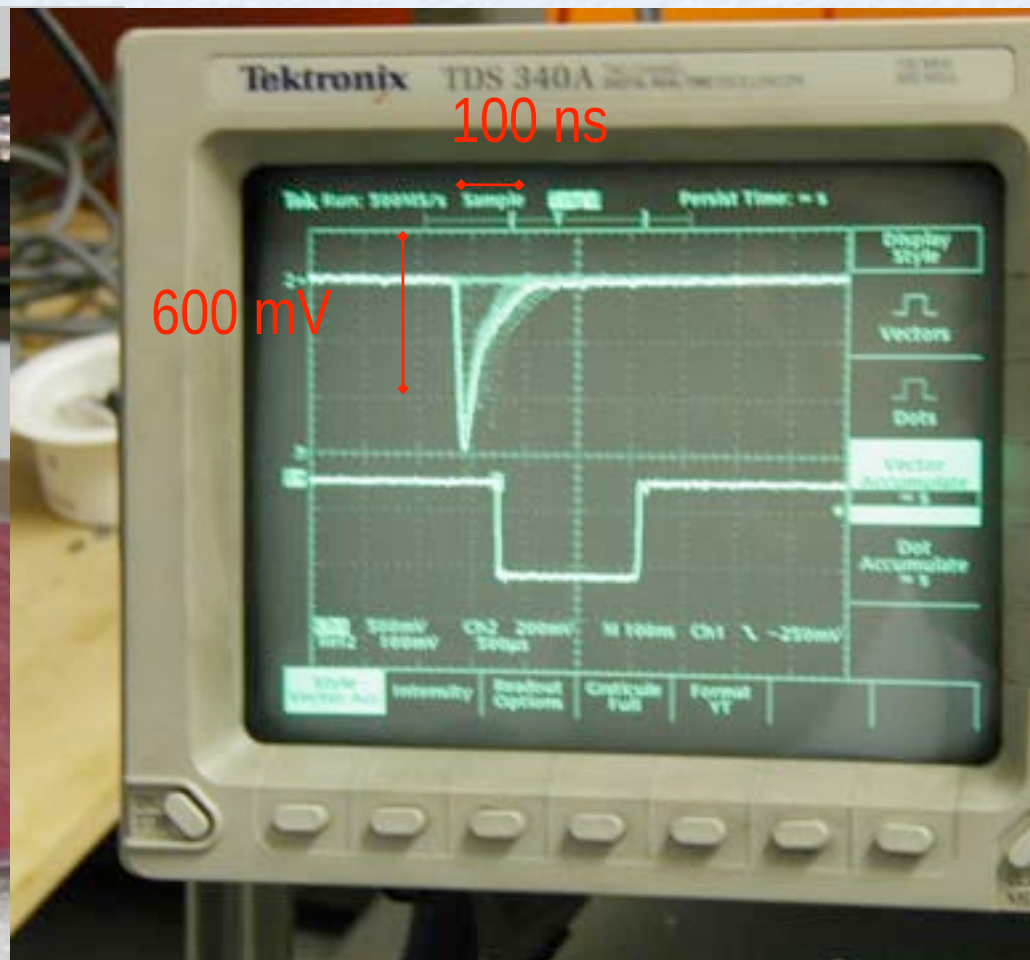


DETECTOR R/D IMPACT CONT.

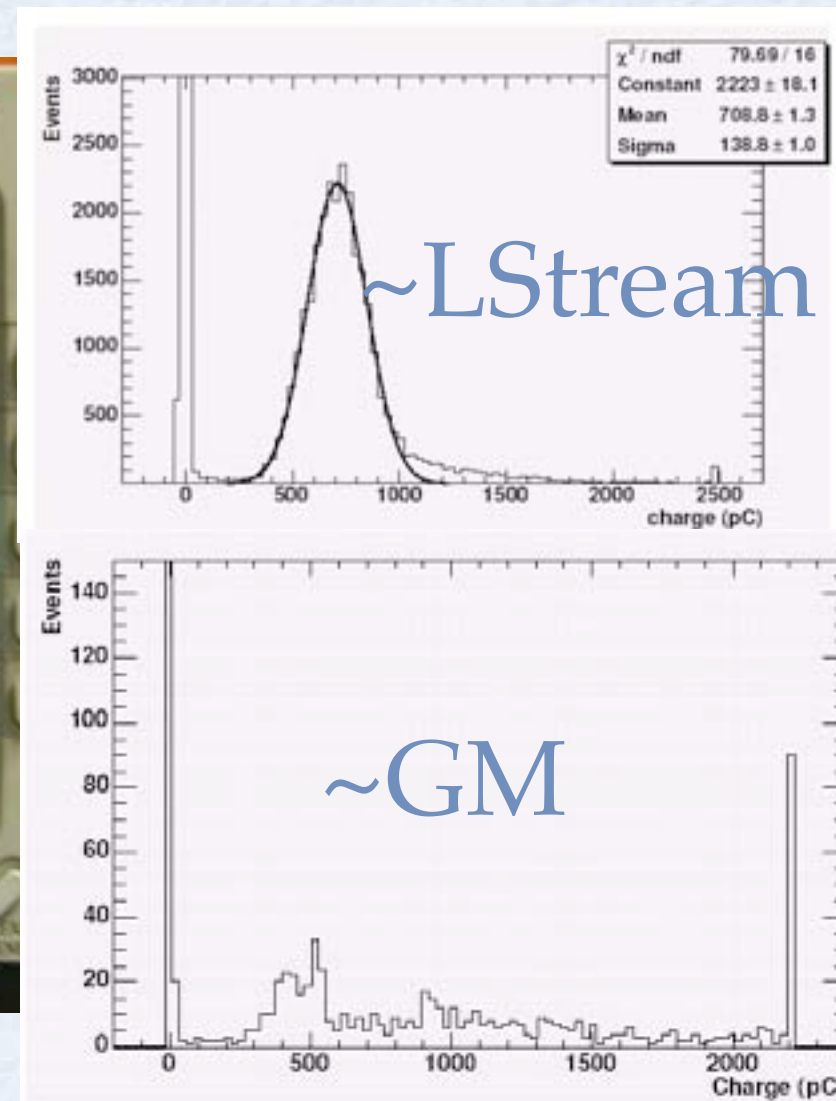
- Mechanically Quenched RPC : M.Piccolo



3mm mesh
sandwiched

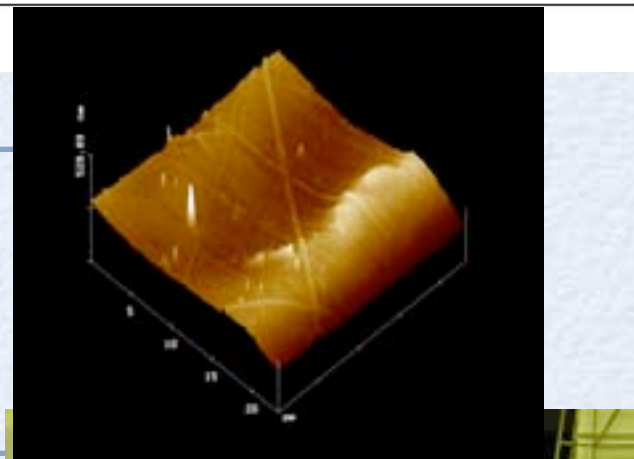
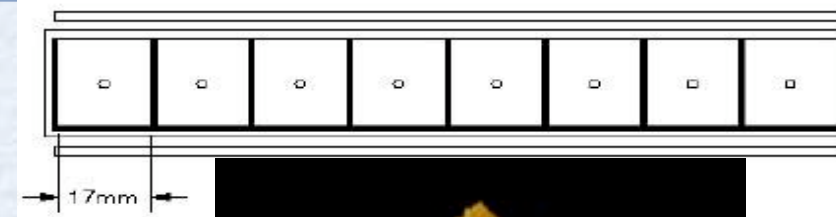
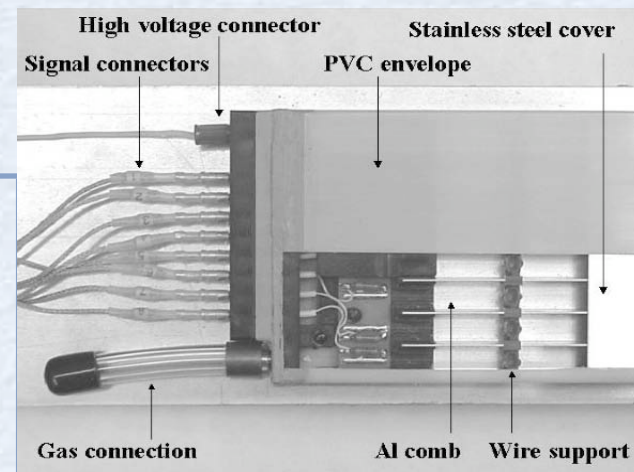


mechanical Quench works



MUON DETECTORS

detector type	current application	talker
wire chamber	D0 Forward BaBar	D.Denisov S.Swain
RPC	BaBar,Belle, BESIII	C. Lu
scintillator	prototype MINOS	R.Abrams,M.Wayne M.Thomson



SUMMARY

- muon activity is growing up
- showing nice results
- we've learnt many examples
- hope more interest on muon activity
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