

Status CERN experiment 2/2

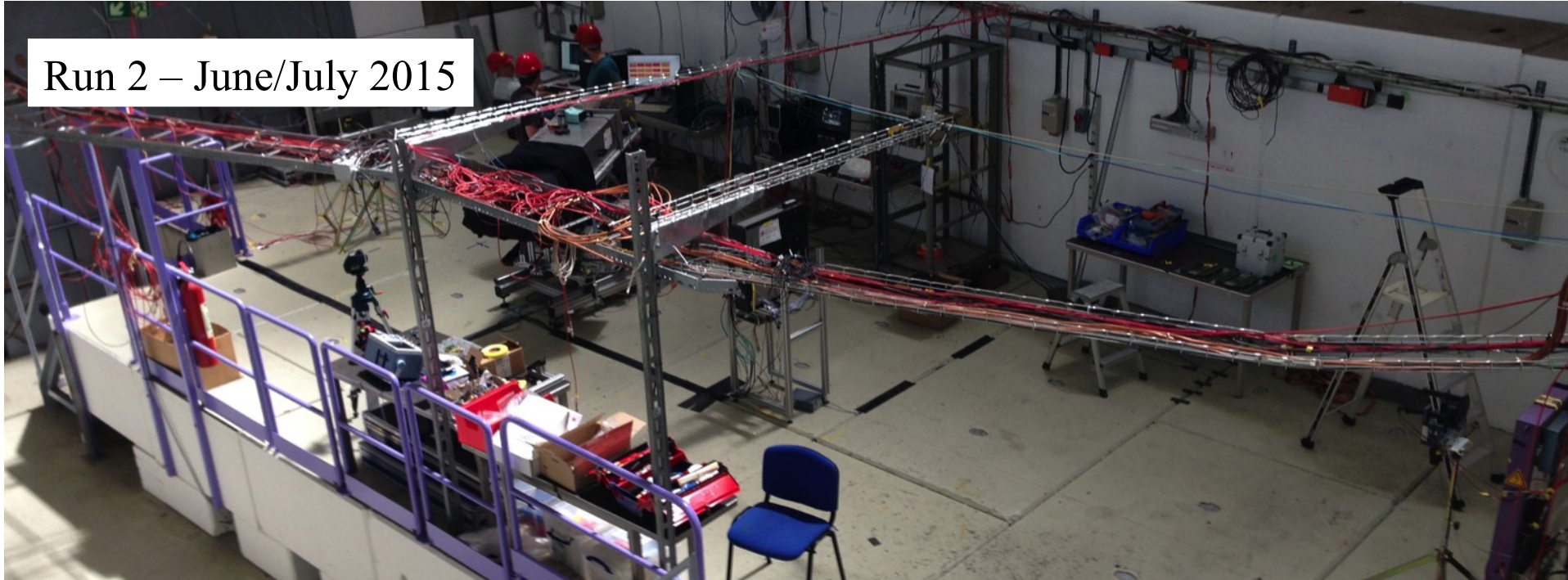
C.Schwarz, **GSII**

1/2

Run 1 – May 2015



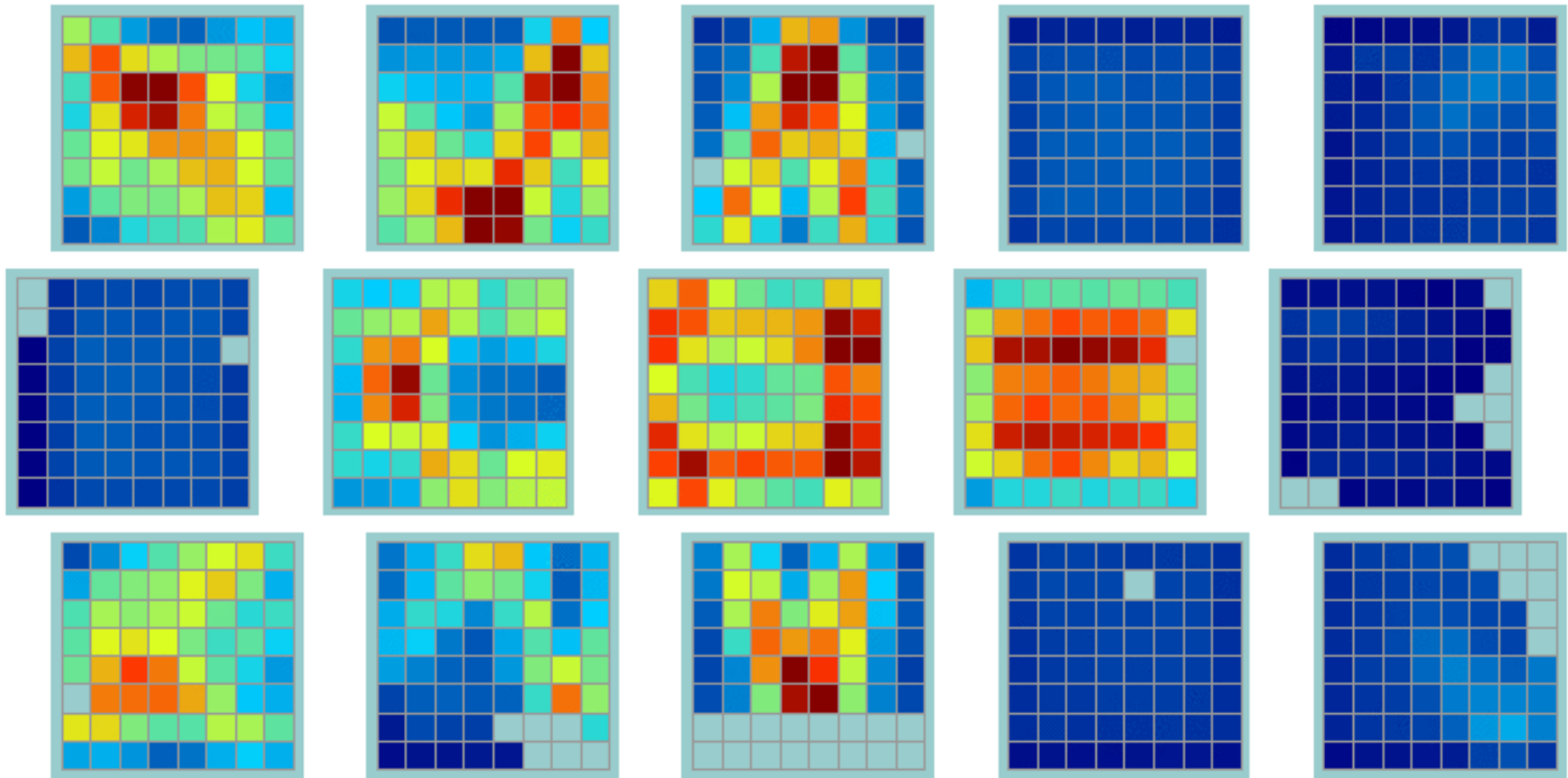
Run 2 – June/July 2015



Many different configurations tested, most of them with detailed angle and/or momentum scans.

	22-jun	23-jun	24-jun	25-jun	26-jun	27-jun	28-jun	29-jun	30-jun	01-jul	02-jul	03-jul	04-jul	05-jul	06-jul	07-jul	08-jul
radiator					bar							plate				bar	
focusing	3 layer spherical					2LS	2LC	none		2LC		air	2LC/S	none			
angle scan				7	5		7	7	5	7/5	7/5		7				
momentum scan																	
other						Z/X				Z/X		Z/X					
runstaken	2	24	26	19	79	49	16	19	36	10	62	60	63	54	76	56	26

Cherenkov hit pattern (folded ring image) for different polar angles (one night shift)



Some things went very well.

Stable mechanics, smooth rotation with remote control, no angular deviations.

Optical coupling MCP-PMTs/prism and prism/lens/bar without bubbles.



PADIWA modification effective against noise.

PADIWAs and cables held rock-solid in cages.

Combined DAQ ran smoothly (*firmware issues*)

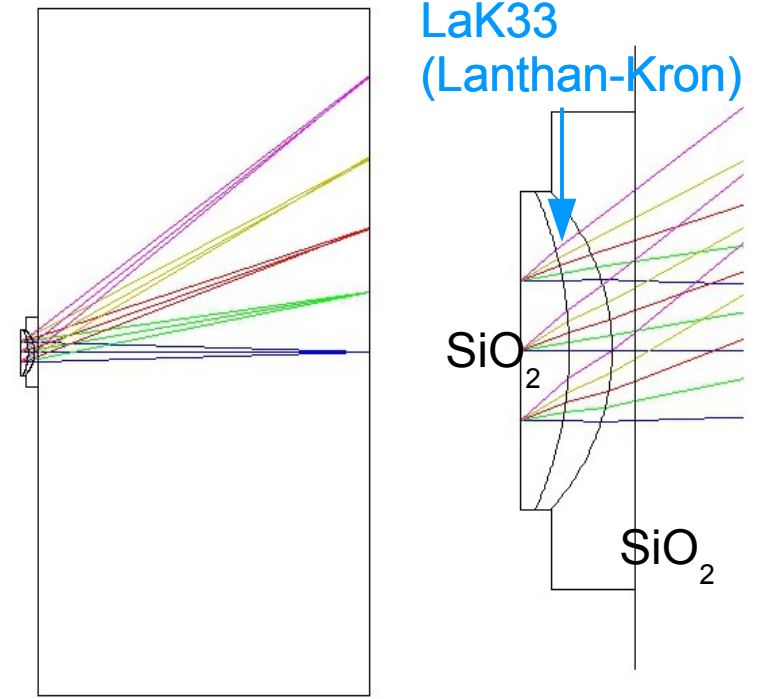
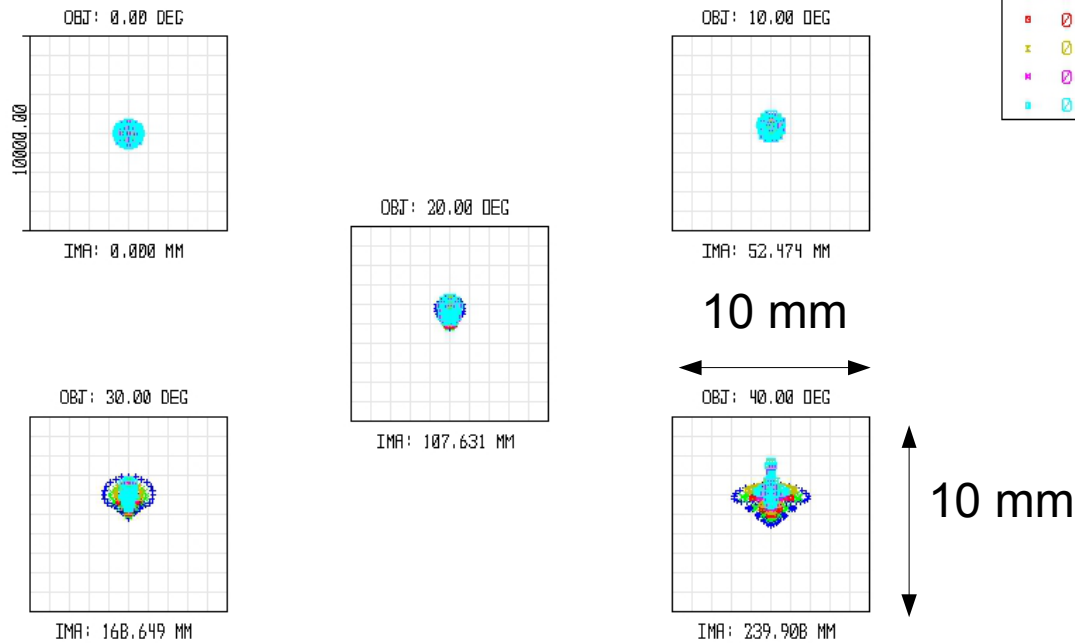
New slow control extremely helpful.

... and quite a few more...

New N-LaK33 lense designed with ZEMAX

No lead, no arsenic

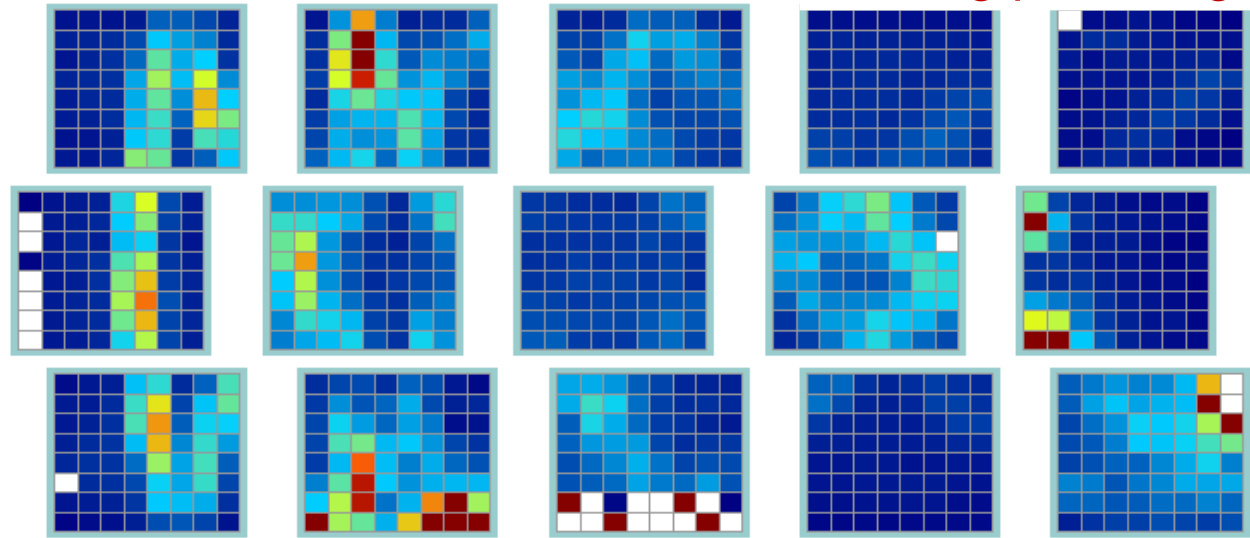
Surf	Type	Comment	Radius	Thickness	Glass	Semi-Diameter	Conic	Par 0 (unused)	Par 1 (unused)	Par 2 (unused)
OBJ	Standard	Object	Infinity	Infinity	SUPRASIL	Infinity	0.000			
*	Standard	SiO2	Infinity	6.382 E	SUPRASIL	20.000 U	0.000			
2*	Standard	Lens12 middle	-47.828 V	5.603 E	LAK33	20.000 U	0.000			
3*	Standard	Lens2 front	-29.039 V	3.000	SUPRASIL	20.000 U	0.000			
4*	Standard		Infinity	300.000	SUPRASIL	30.000 U	0.000			
IMA	Standard	Image	Infinity	-	SUPRASIL	300.000 U	0.000			



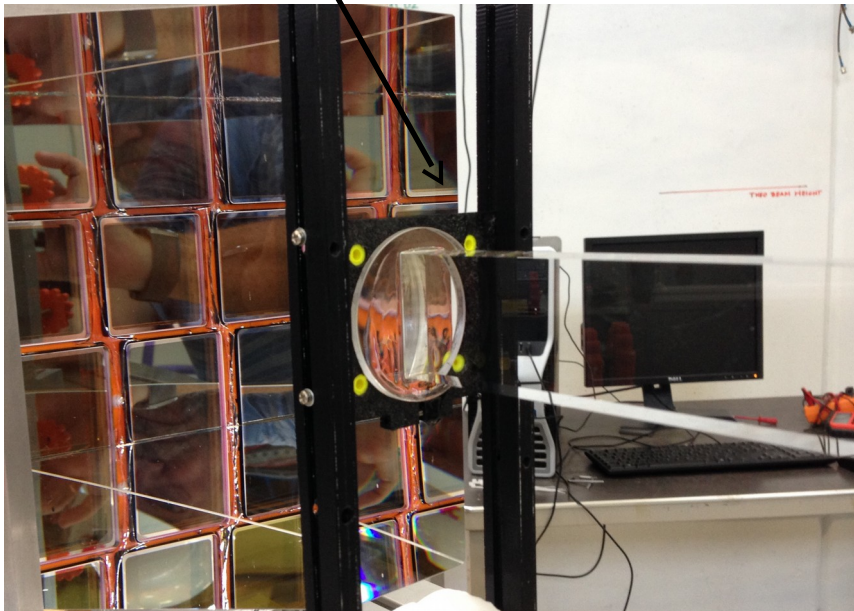
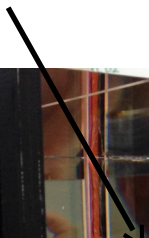
SURFACE IMA: IMAGE					SPOT DIAGRAM					LAYOUT		CONFIGURATION	
LENS6 2MM EDGE					LENS2014_LENS6.ZMX					14.98523 MM		LENS2014_LENS6.ZMX	
WED MAY 14 2014 UNITS ARE μm.					CONFIGURATION 1 OF 1							CONFIGURATION 1 OF 1	
FIELD :	1	2	3	4	5								
RMS RADIUS :	402.561	437.278	580.905	841.077	1181.12								
GEO RADIUS :	631.426	1028.39	1366.36	1934.15	2722.04								
BOX WIDTH :	1E+004					REFERENCE : CHIEF RAY							

tdisplay /d/may2015/ce15145205719.hld.r

124deg polar angle



Quartz bar, coupled to
focusing lens, prism
expansion volume
and MCP-PMT array



Observed sharp image with
new lens design
even for steep photon angles,
very promising.

Data

firmware issues → solved in 2nd run

Analysis, online

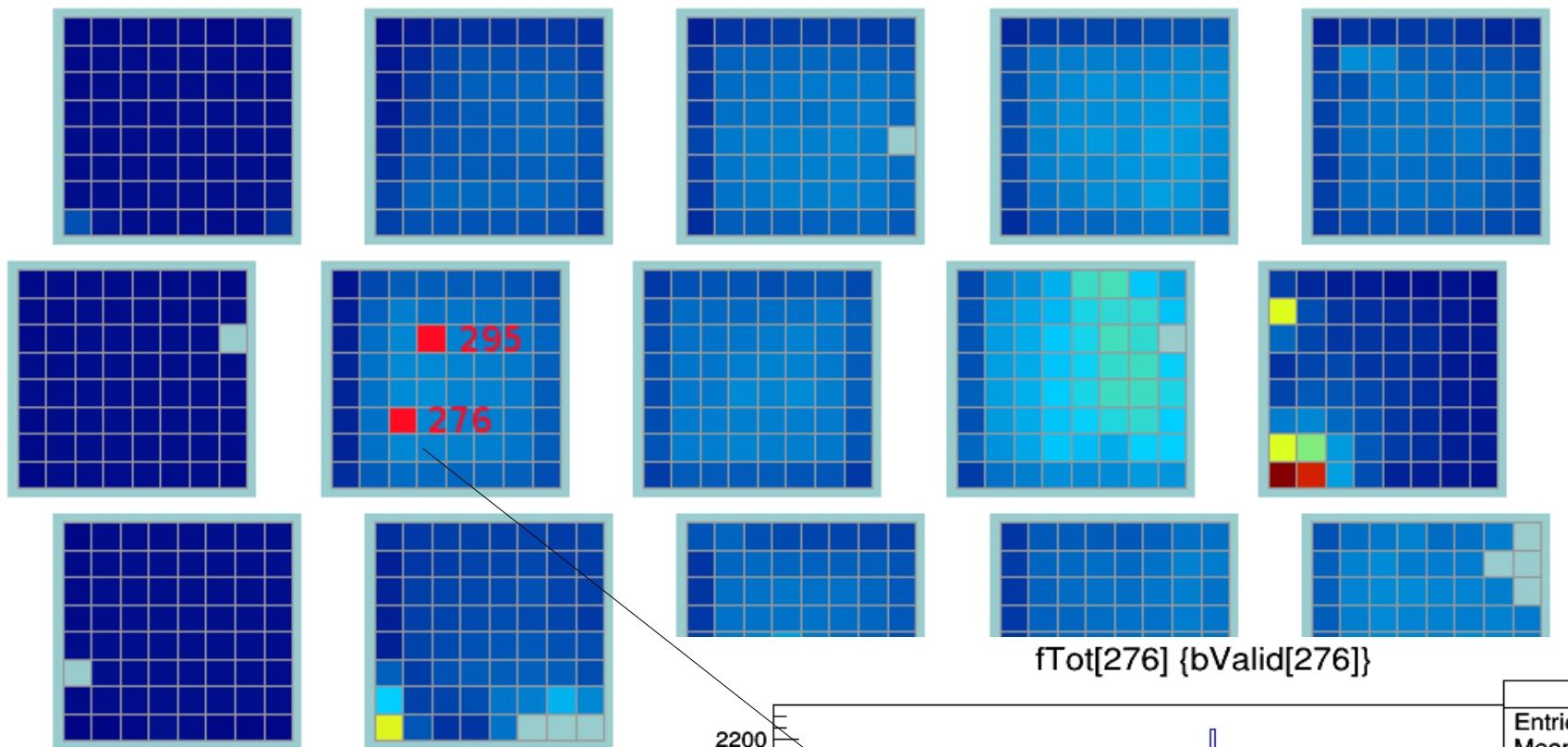
Time resolution of x00 ps

→ walk correction important

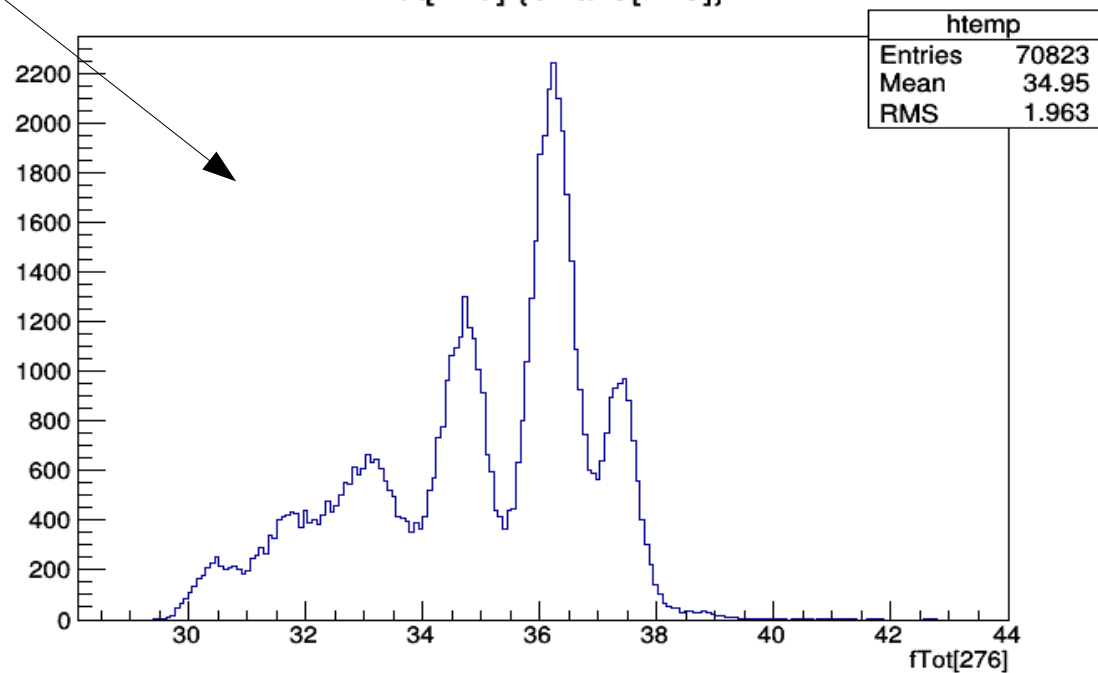
TOT showed peak structure

verified offline

Multiple Peaks in TOT



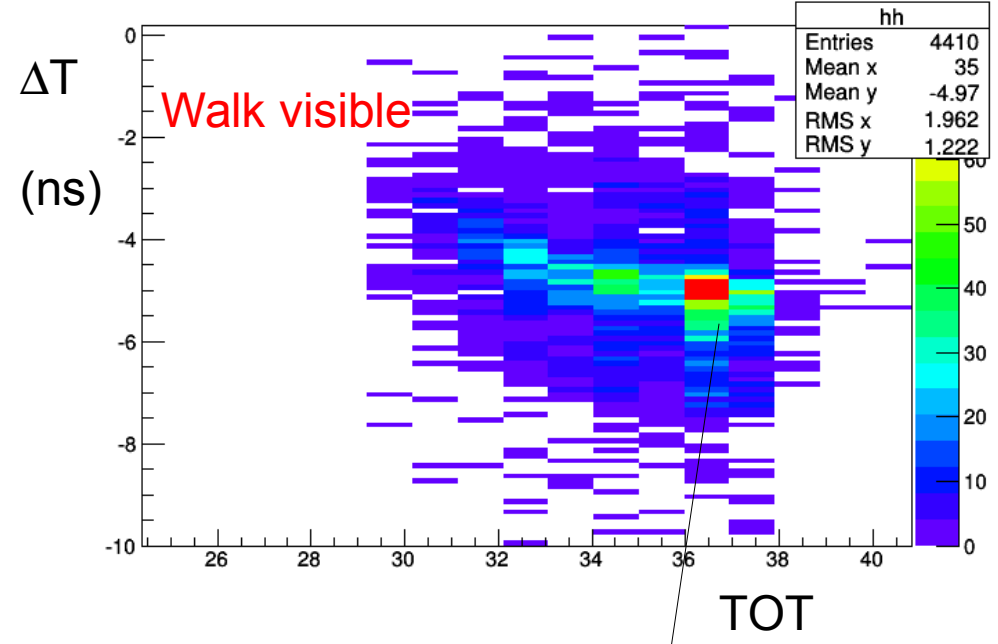
$fTot[276]$ { $bValid[276]$ }



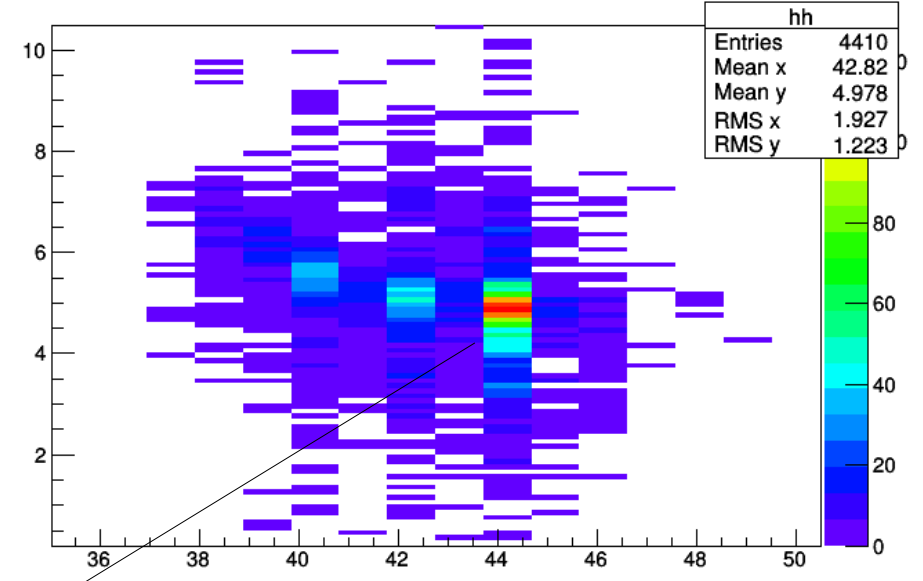
pilas120_15185084004.hld

fLeadingEdge[276]-fLeadingEdge[295] : fTot[276]

fLeadingEdge[276]-fLeadingEdge[295]:fTot[276] (bValid[276] && bValid[295])



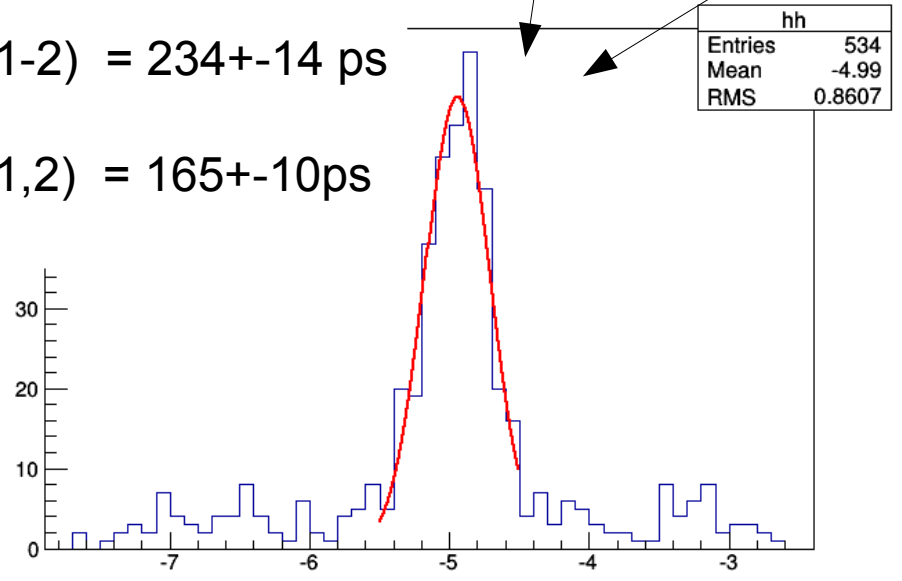
fLeadingEdge[295]-fLeadingEdge[276]:fTot[295] (bValid[276] && bValid[295])



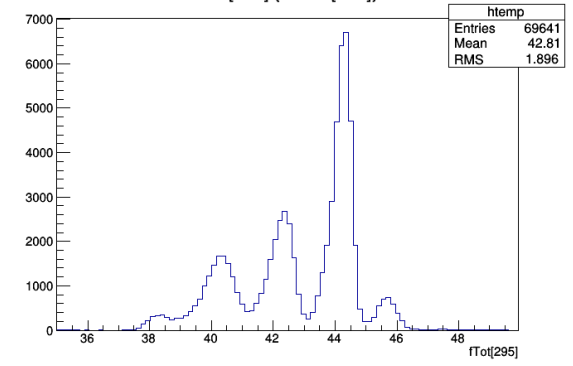
fLeadingEdge[276]-fLeadingEdge[295] (bValid[276] && bValid[295] && abs(Tot[276]-36.25)<0.5 && abs(Tot[295]-44.25)<0.5)

$\sigma(1-2) = 234 \pm 14$ ps

$\sigma(1,2) = 165 \pm 10$ ps



fTot[295] (bValid[295])

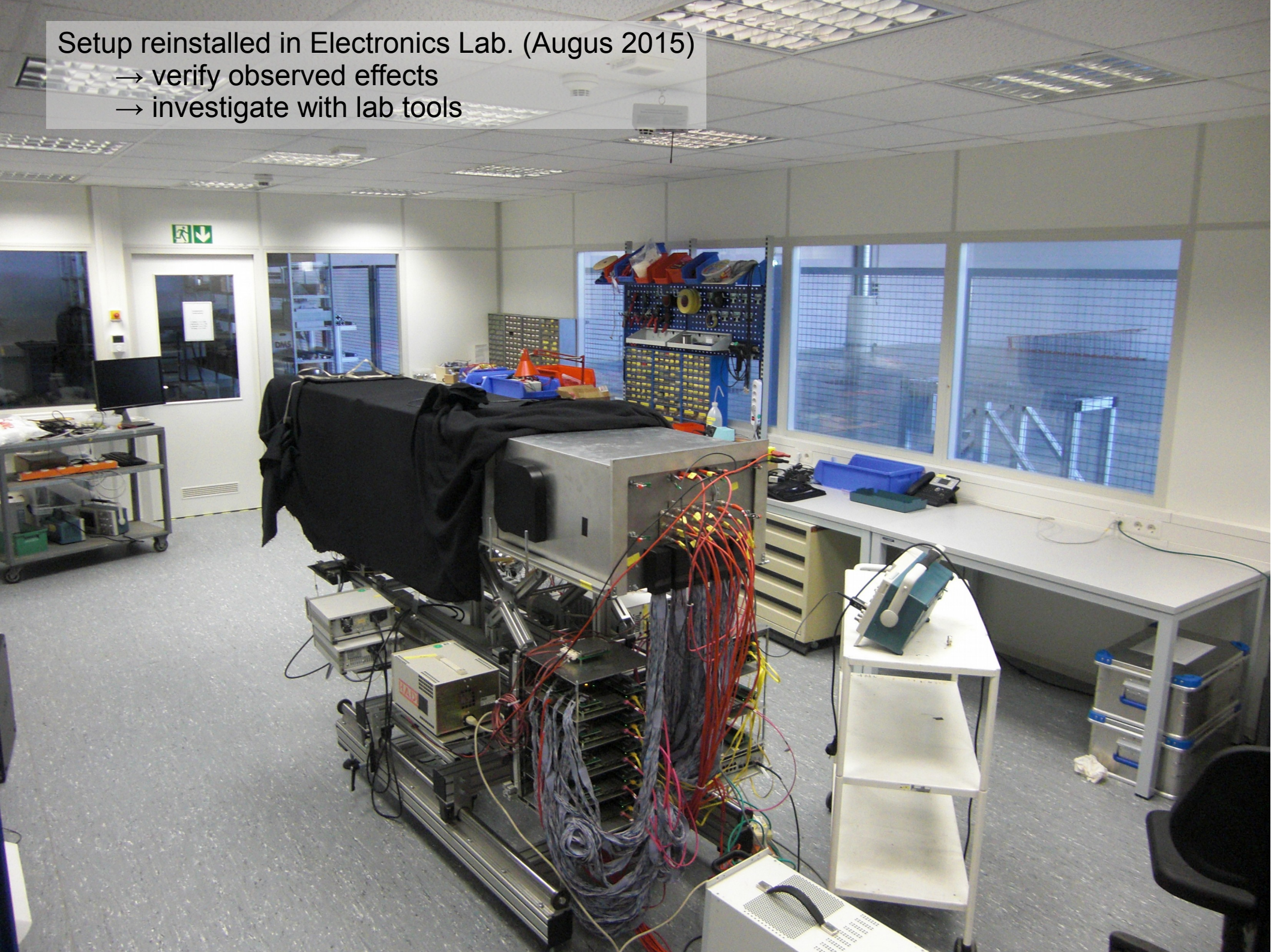


The peaks look not like repeated TOT distributions

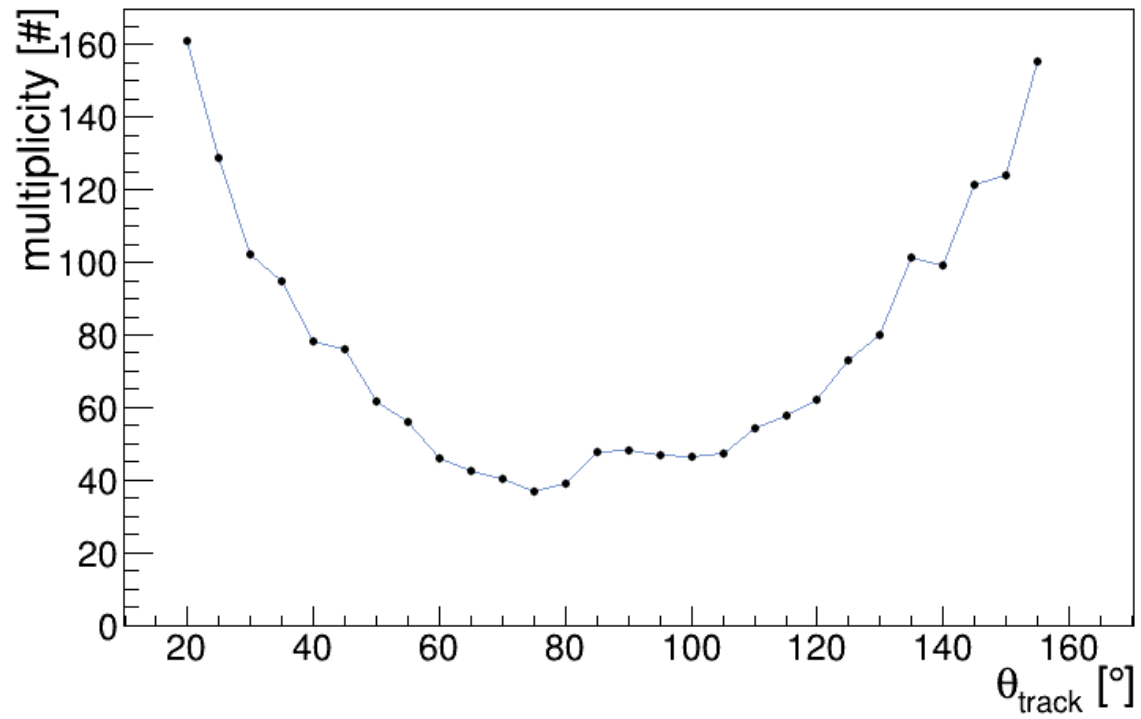
Rather like a odd shaped common TOT distribution

Setup reinstalled in Electronics Lab. (August 2015)

- verify observed effects
- investigate with lab tools

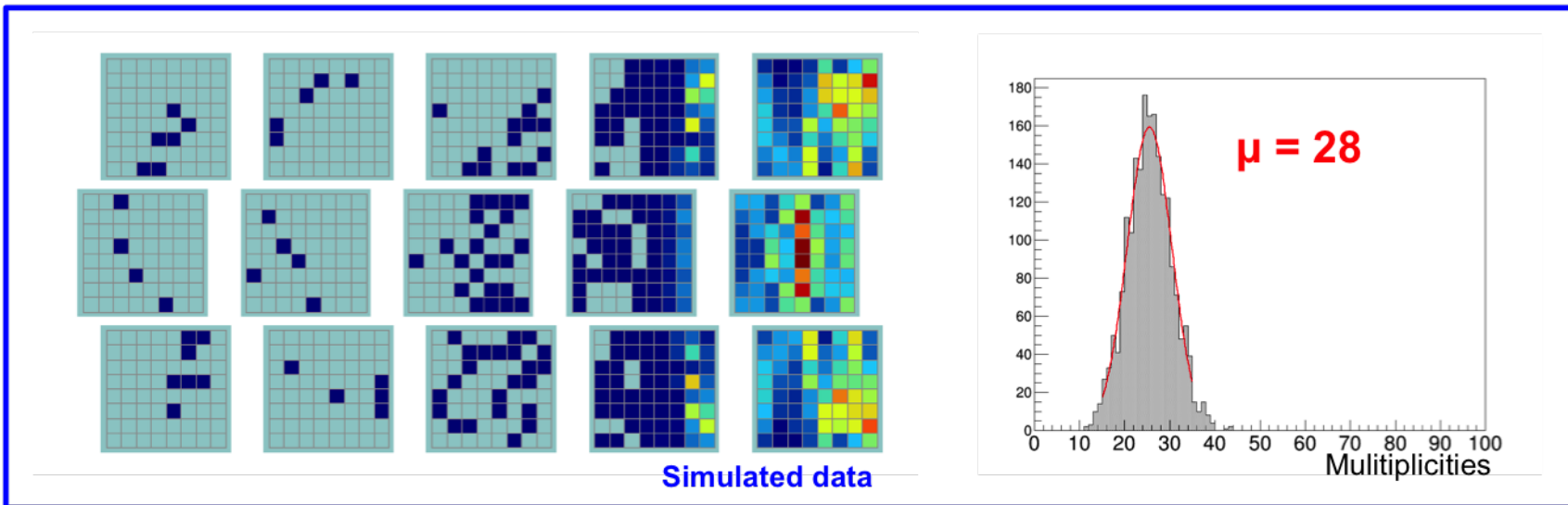
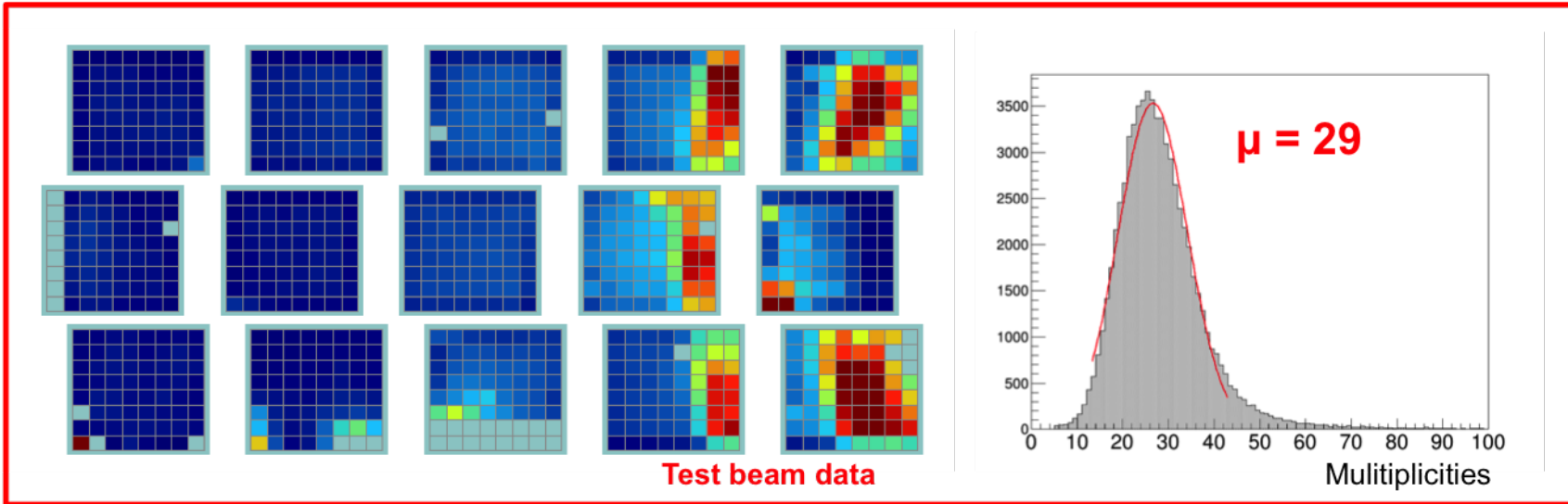


Quick first (quasi-online) look at photon yield of new lens as function of polar angle:



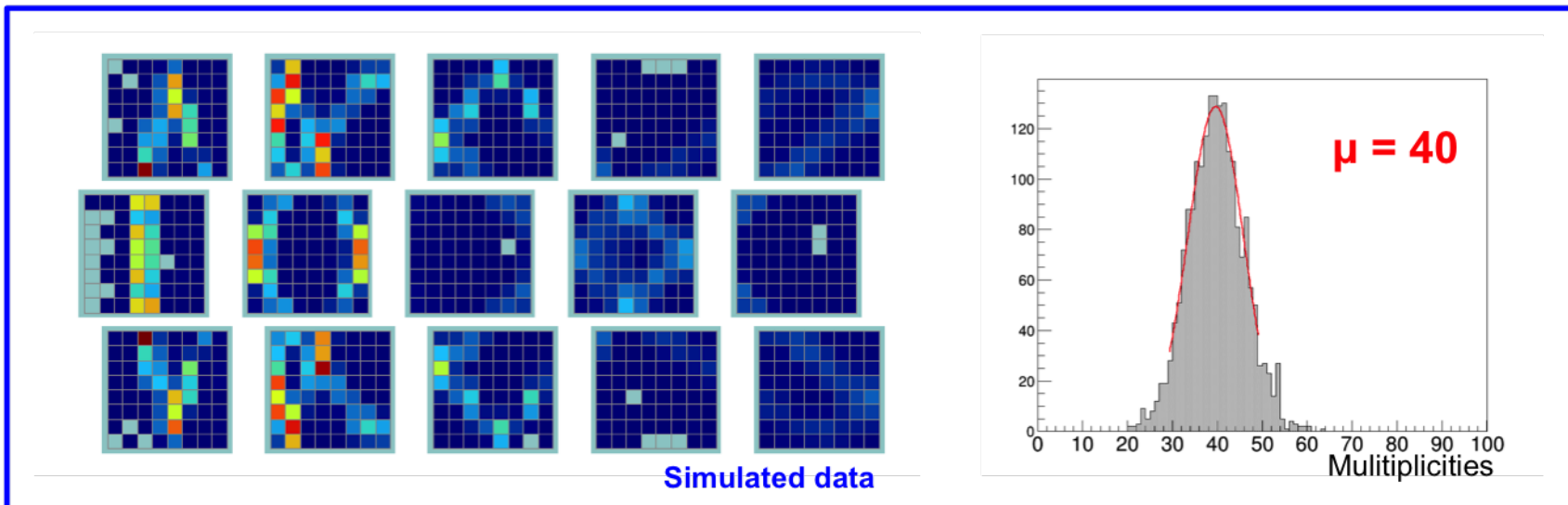
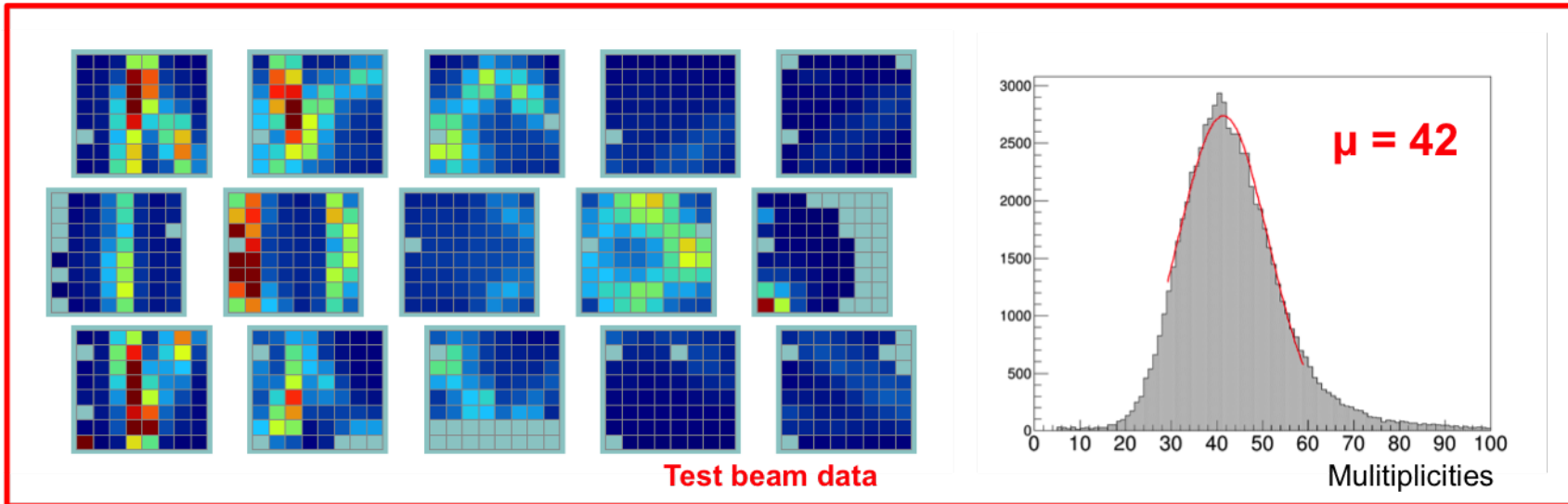
2015 Campaign: Beam polar angle: 90°

7 GeV/c

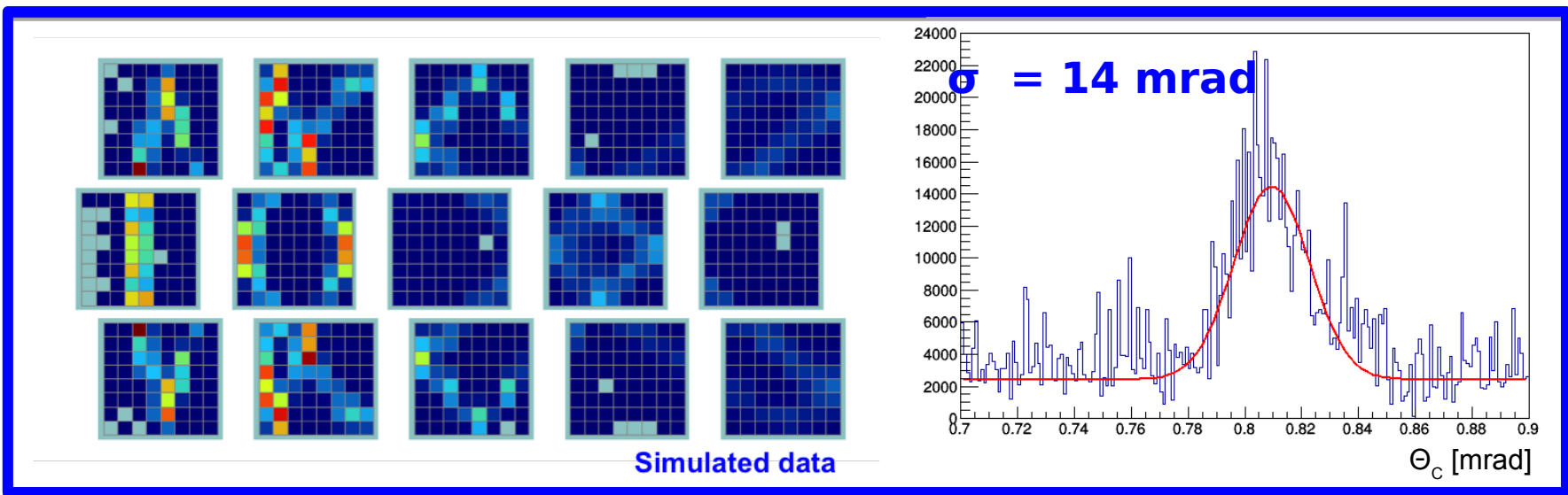
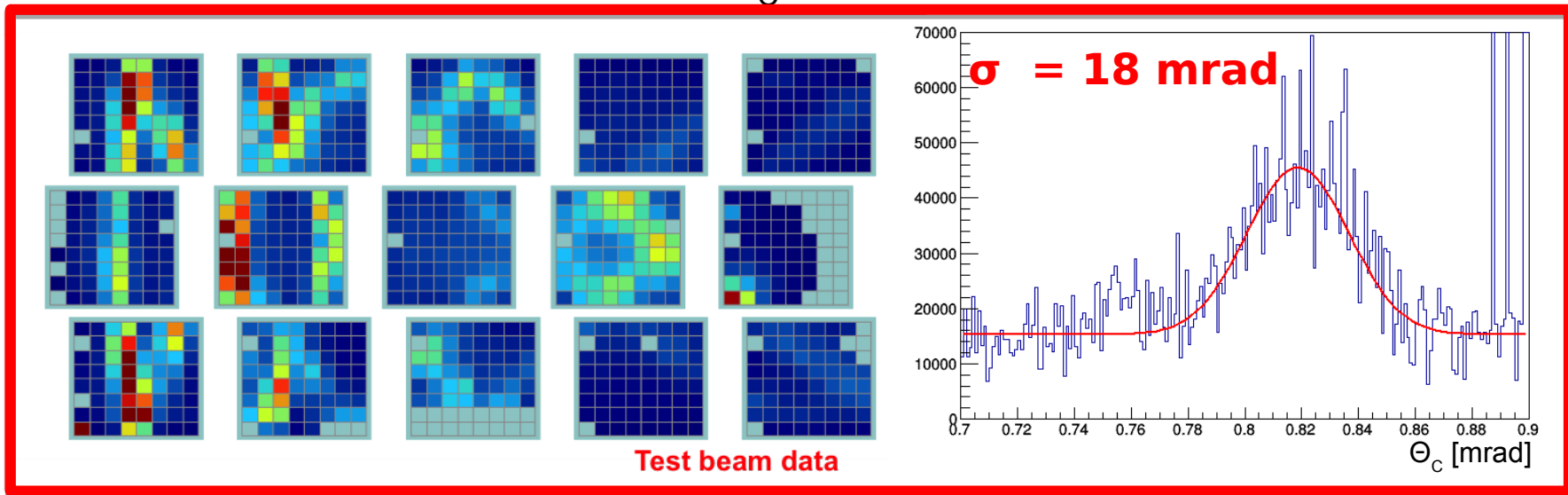


2015 Campaign: Beam polar angle: 125°

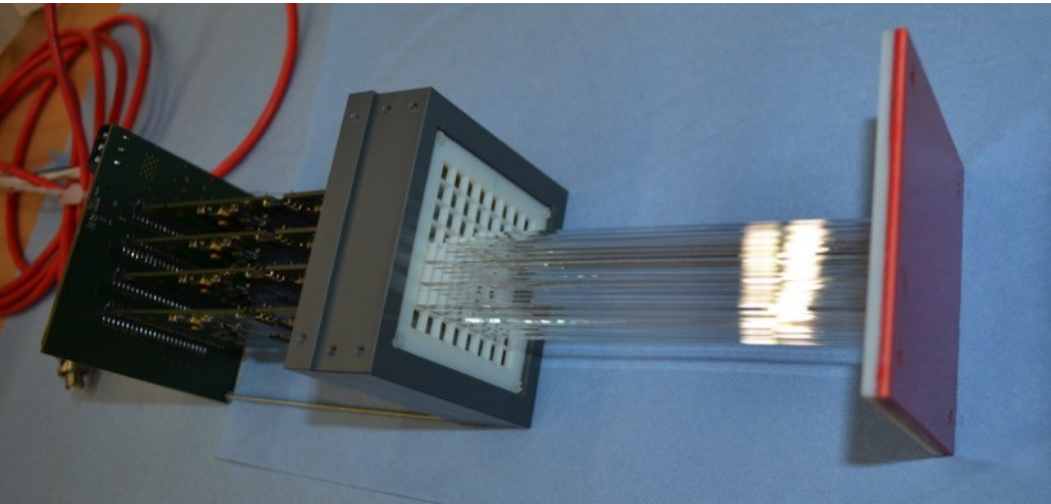
7 GeV/c



2015 Campaign: Beam polar angle: 125°
Reconstructed Θ_C without time cut



FLASH counter



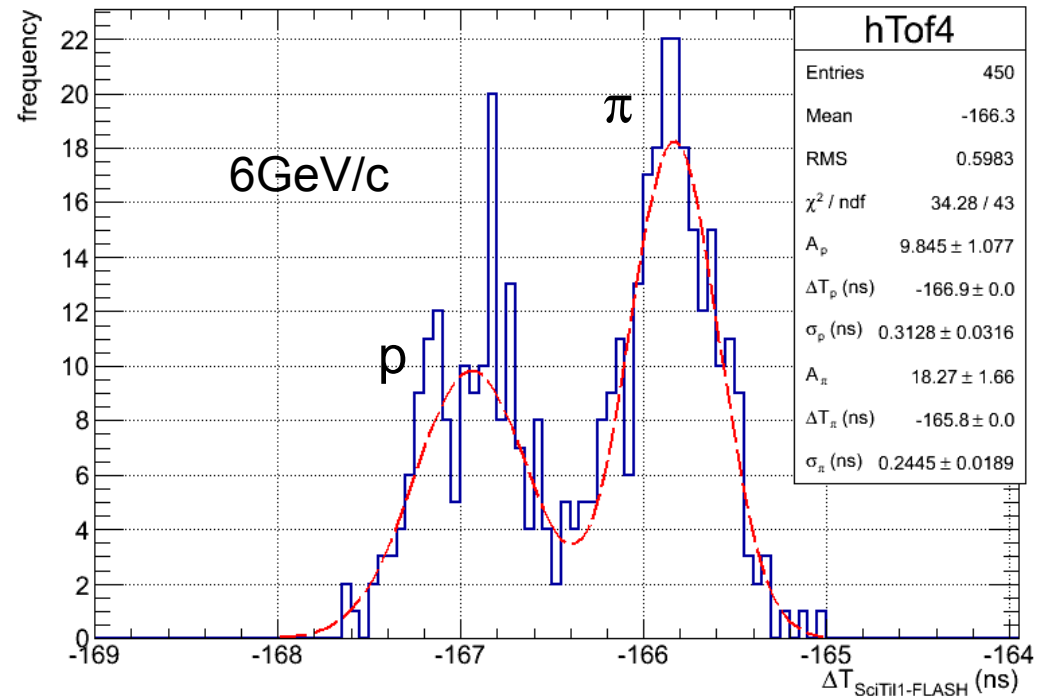
Time-of-Flight between front SciTil and a single FLASH radiator bar

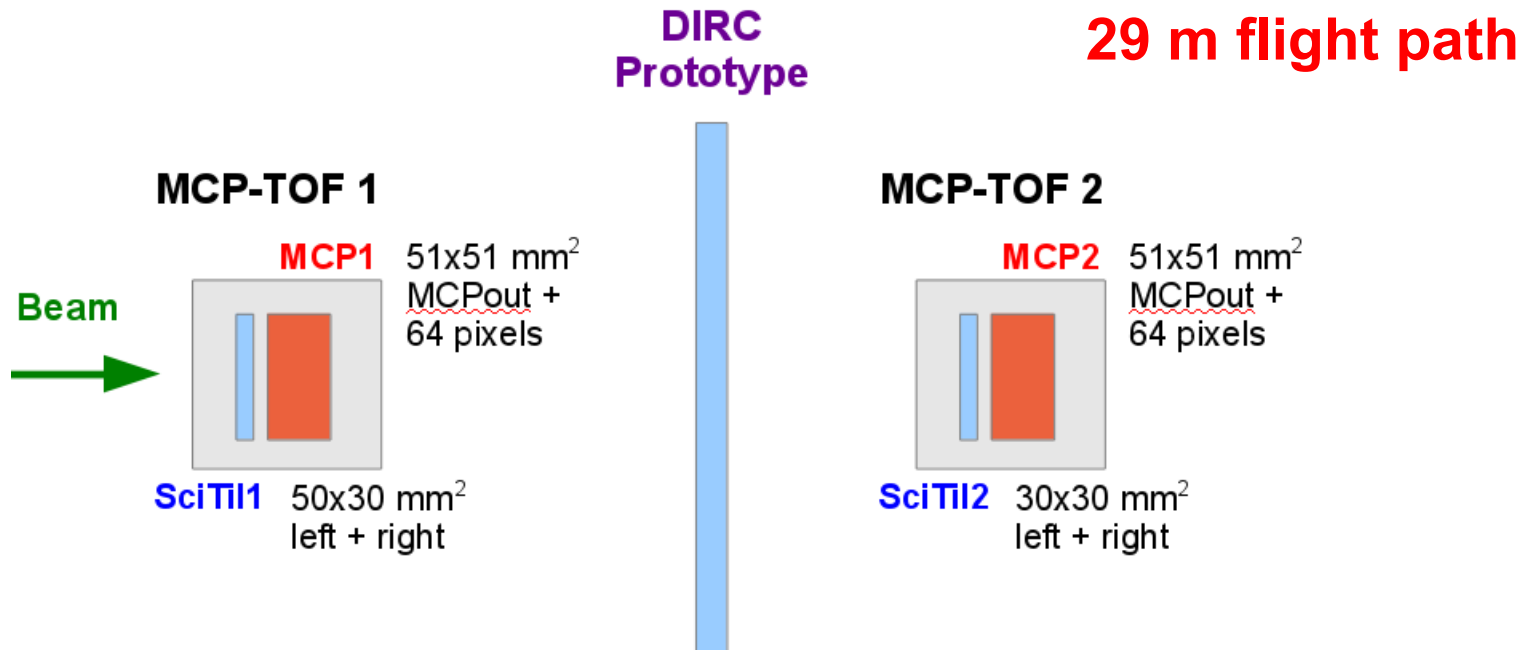
Require

- Hit in front and back SciTil
- ToT cut on FLASH signal

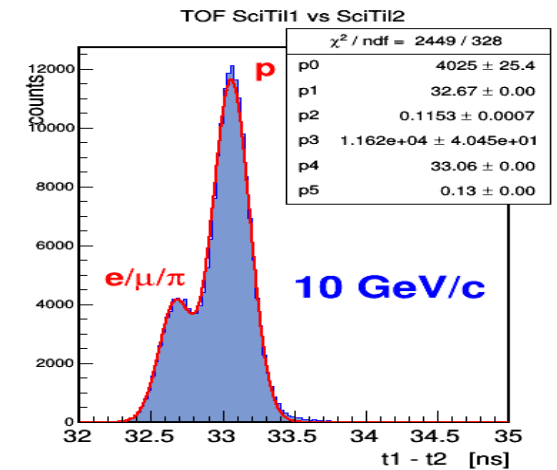
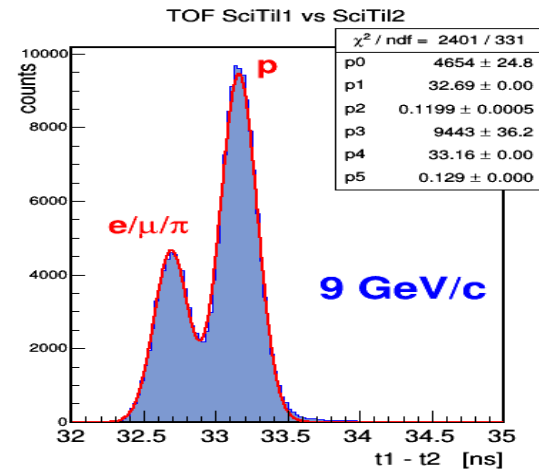
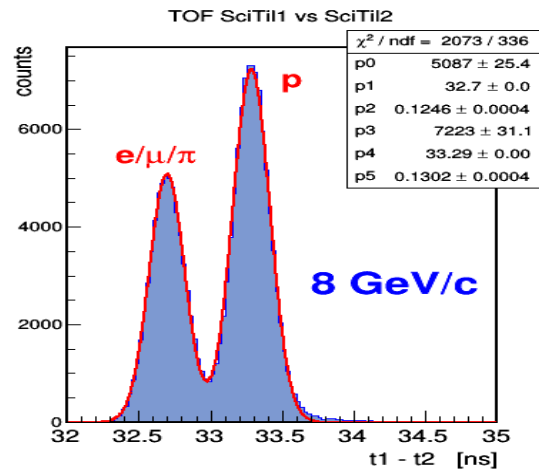
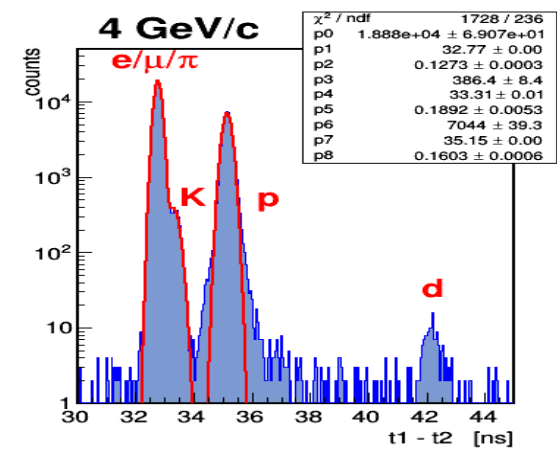
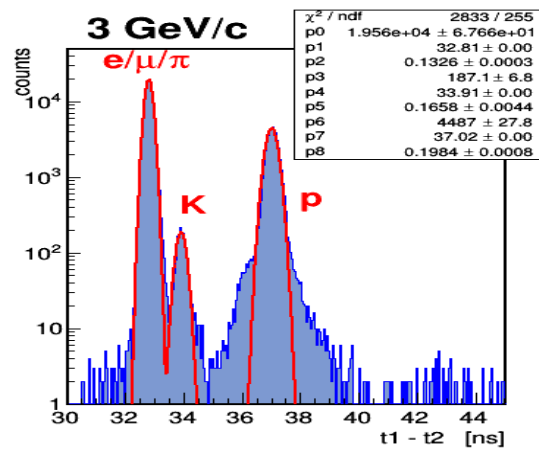
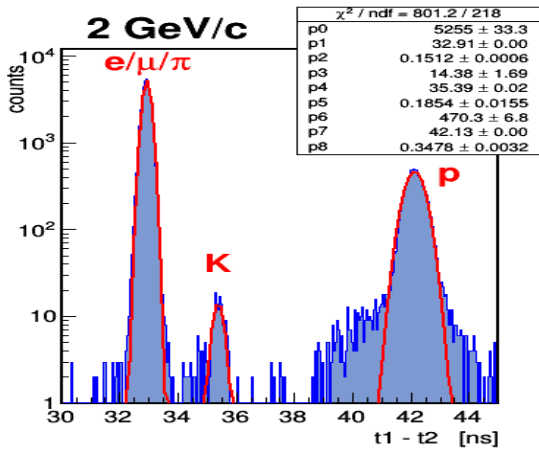
Obtained resolution between $216ps$ and $313ps$

(in quasi-online analysis)





- Station MCP-TOF1 in front of last dipole
- Station MCP-TOF2 at upstream end of T9 experimental area
- Both MCP-TOF stations consist of 1 Scintillating Tile and 1 MCP counter
- 4 TOF infos → determination of time resolution for each counter possible



- Only few kaons, but **pions and protons separable up to 10 GeV/c**
- TOF Resolution ~125 ps, but not yet corrected for timewalk effects

- Stable setup
 - Stable mechanics
 - Reliable rotation (remote)
 - Bubblefree optical coupling (PMT-prism-rad.)
 - Rock solid Padiwa mount
- Focusing with new lens as expected
- DAQ
 - Firmware issues solved (2/2)
- FEE
 - Padiwa modification effective against noise
 - Time resolution needs walk correction