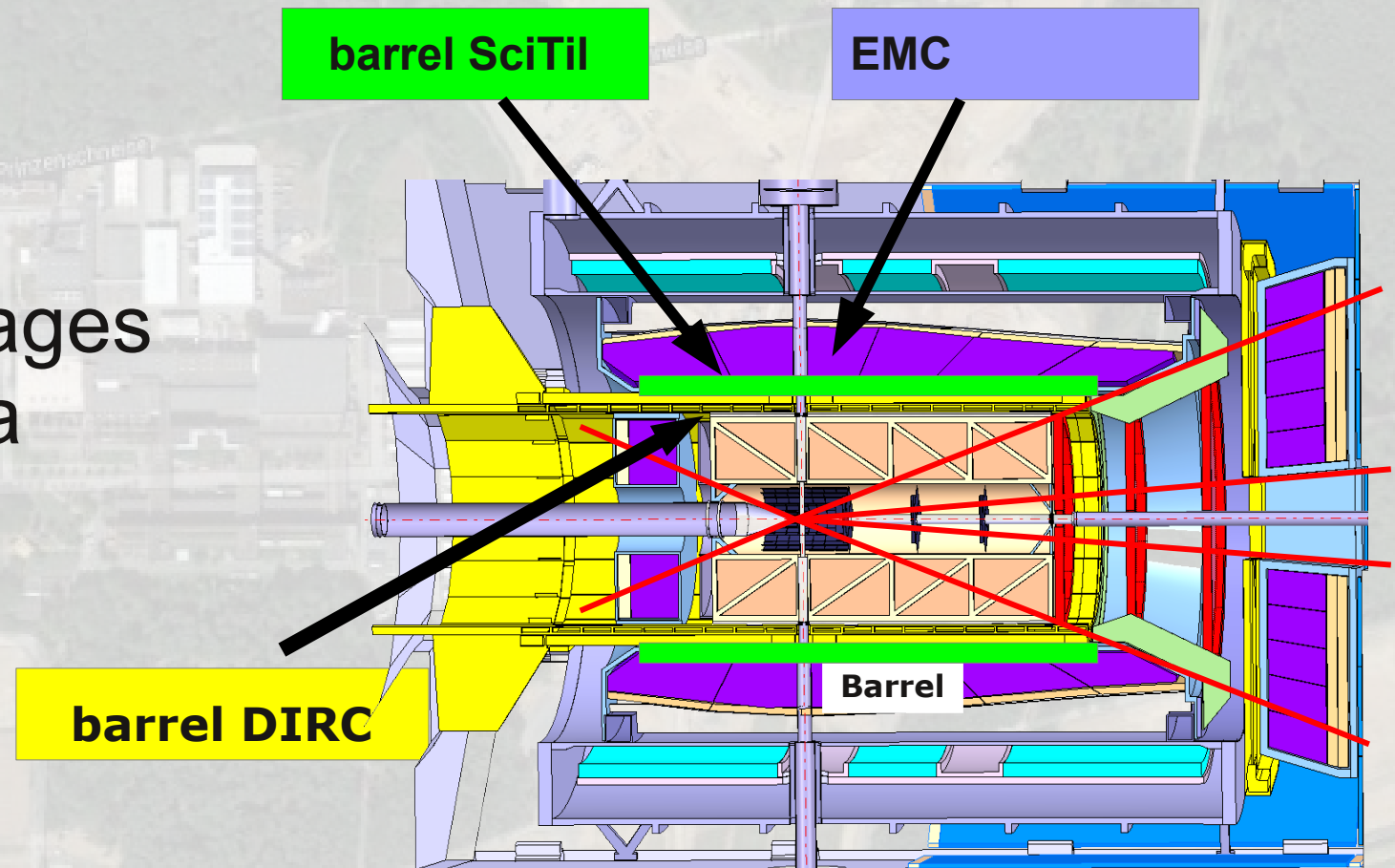


The Status of the SciTil

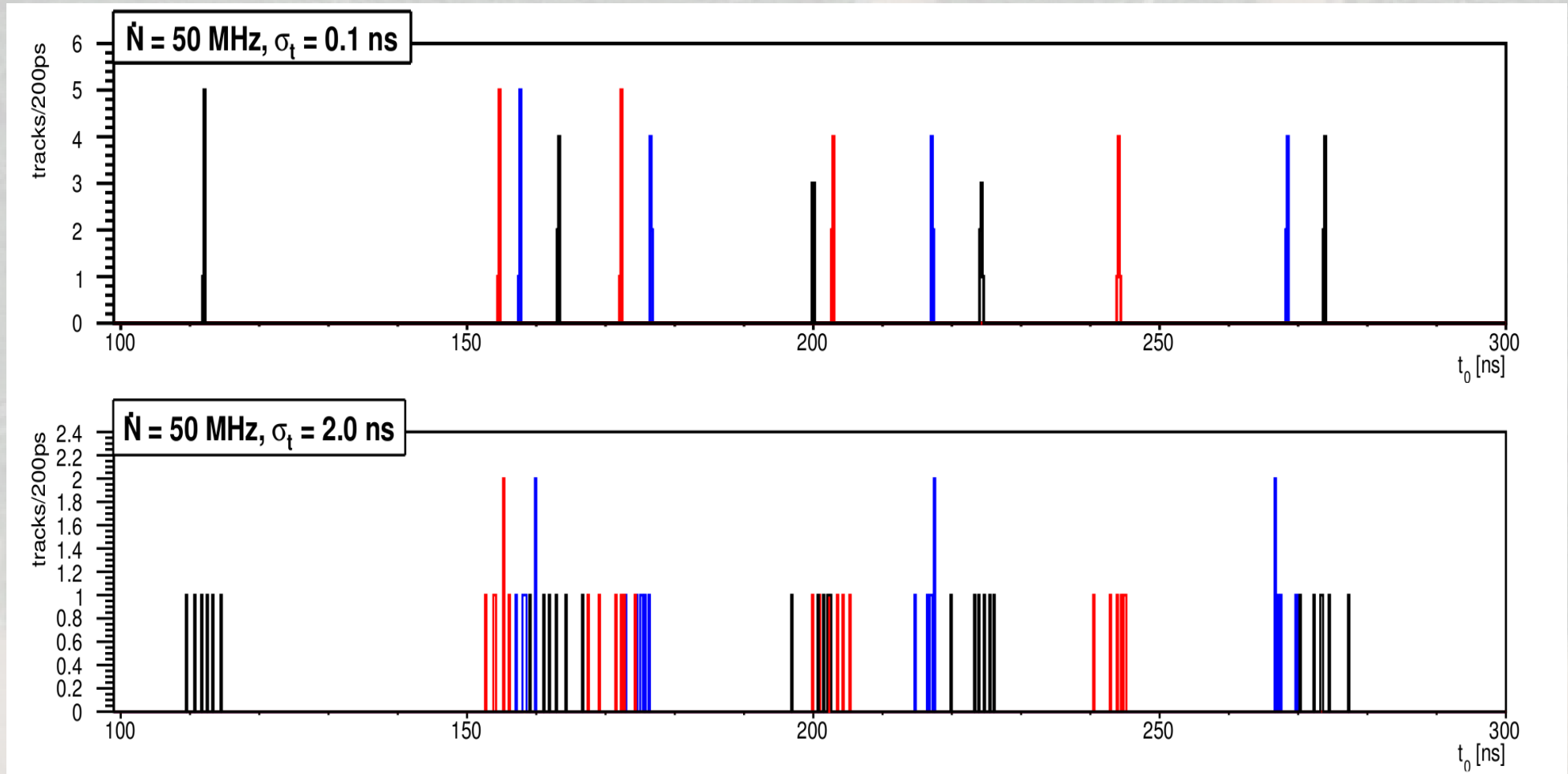
Carsten Schwarz, GSI

- Motivation
- Setup
- Mechanics
- Readout
- Work packages
- Status India
- Costs



Motivation: Event Timing

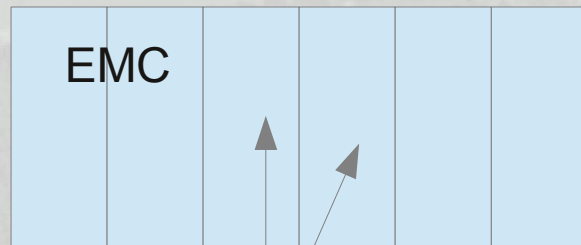
Events 1,2,3,4,5,6,7,8... for 50MHz interaction rate with 6 tracks



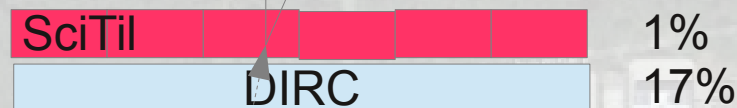
Klaus Götzen, Influence of Particle Timing on Event Building
PANDA collaboration meeting March 2011, GSI

PANDA Collaboration Meeting, GSI, March 2014

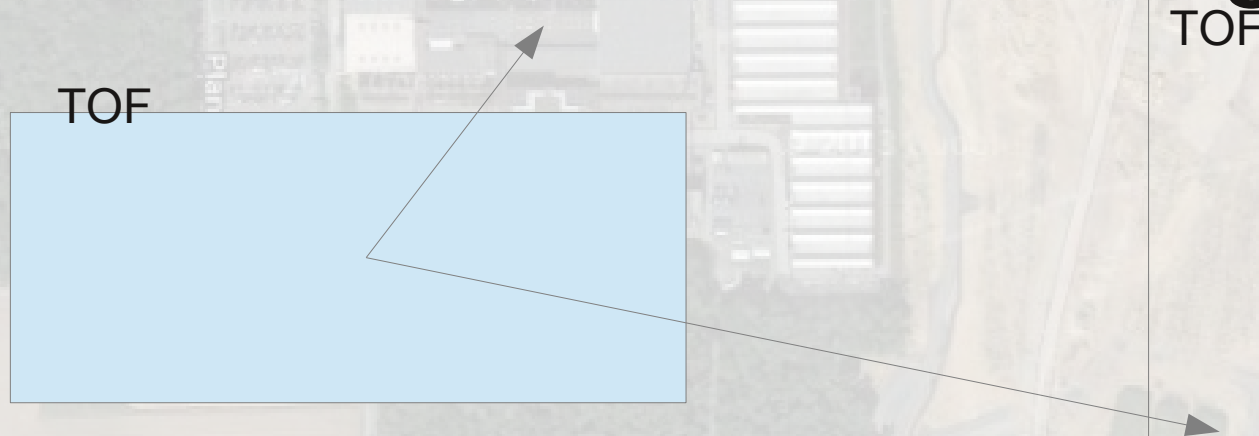
Motivation: Conversion Detection



Conversion of gammas within the DIRC can be detected with the SciTil

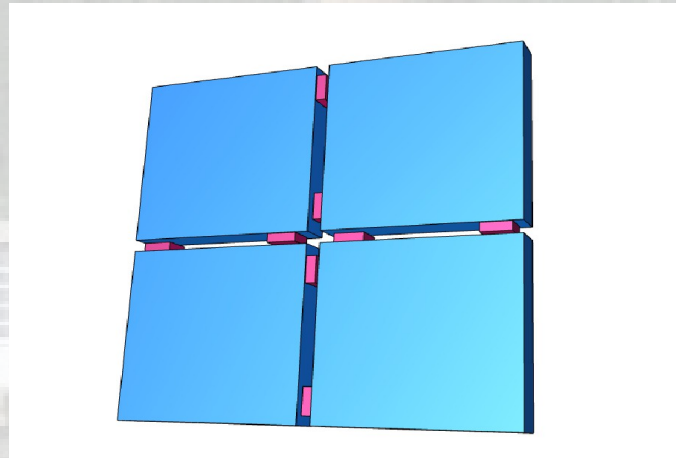
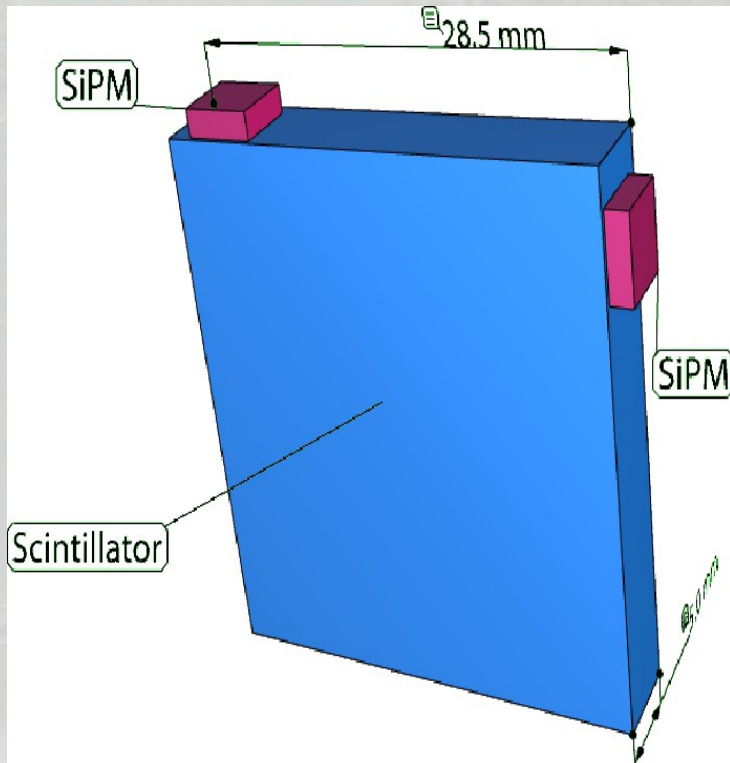


Relative timing

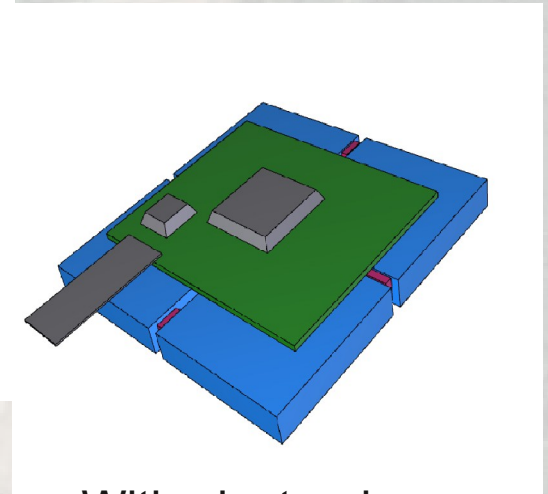


PANDA has no start detector
SciTil important for relative timing and PID

SciTil



Quad module



With electronics
8 ch. ASIC
data transfer IC

Readout at two positions
more photons
less light path fluctuations
larger detection efficiency

Super-module = 90 quad modules

3 x 30 quads

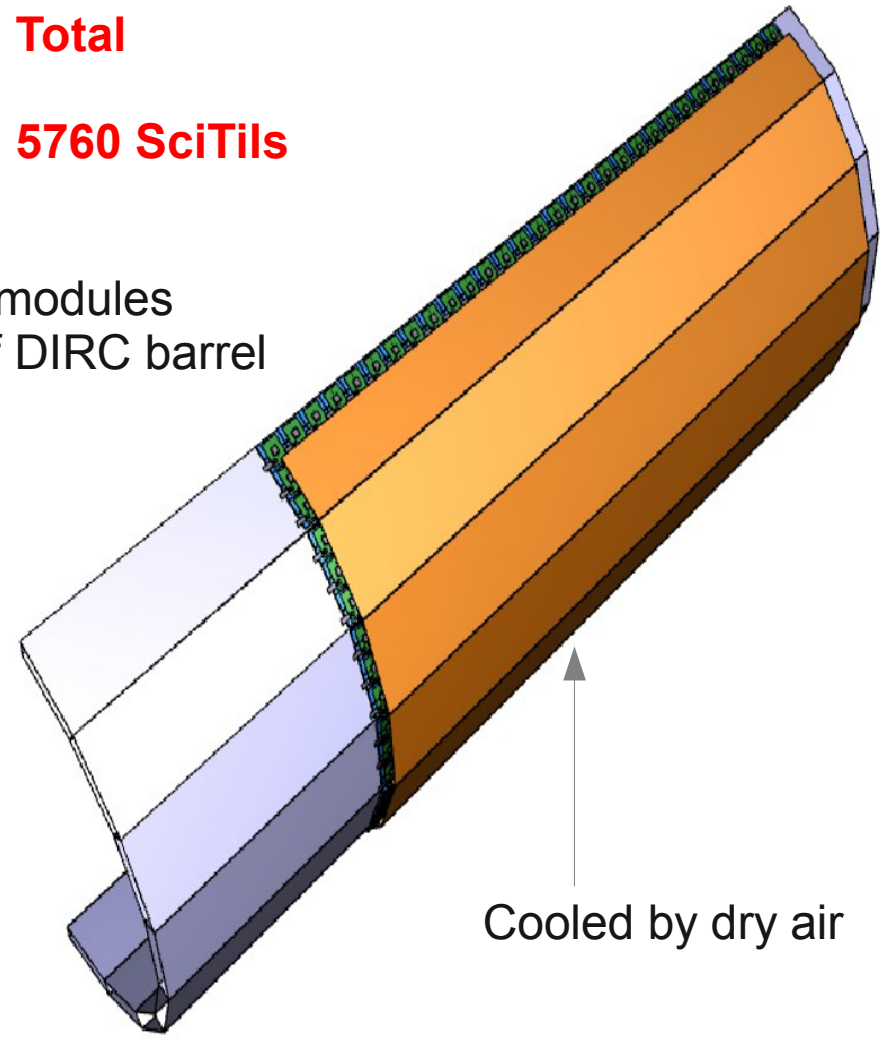
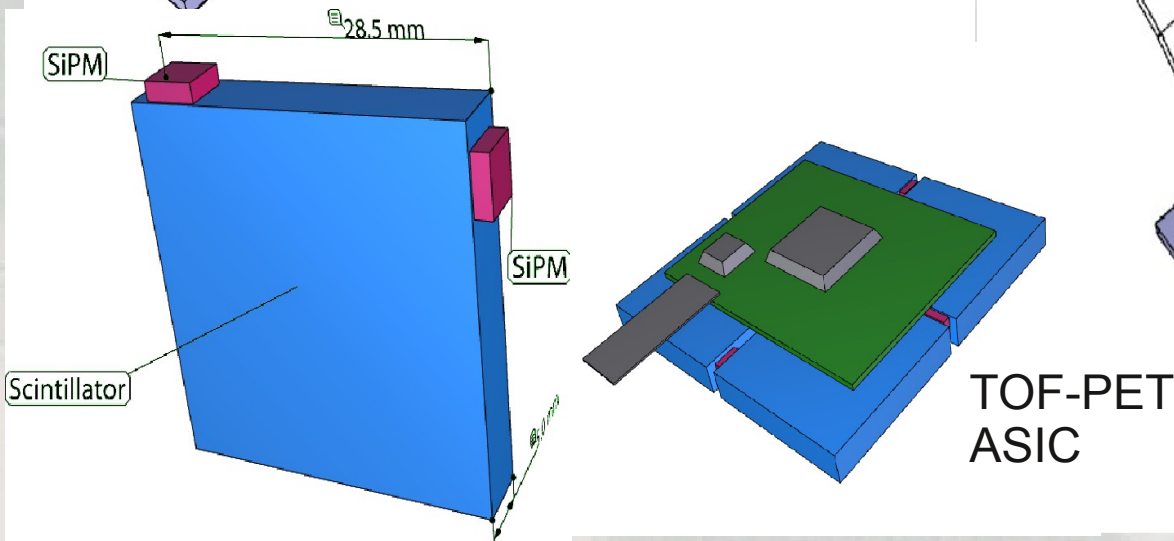
Radial thickness
1.8 cm

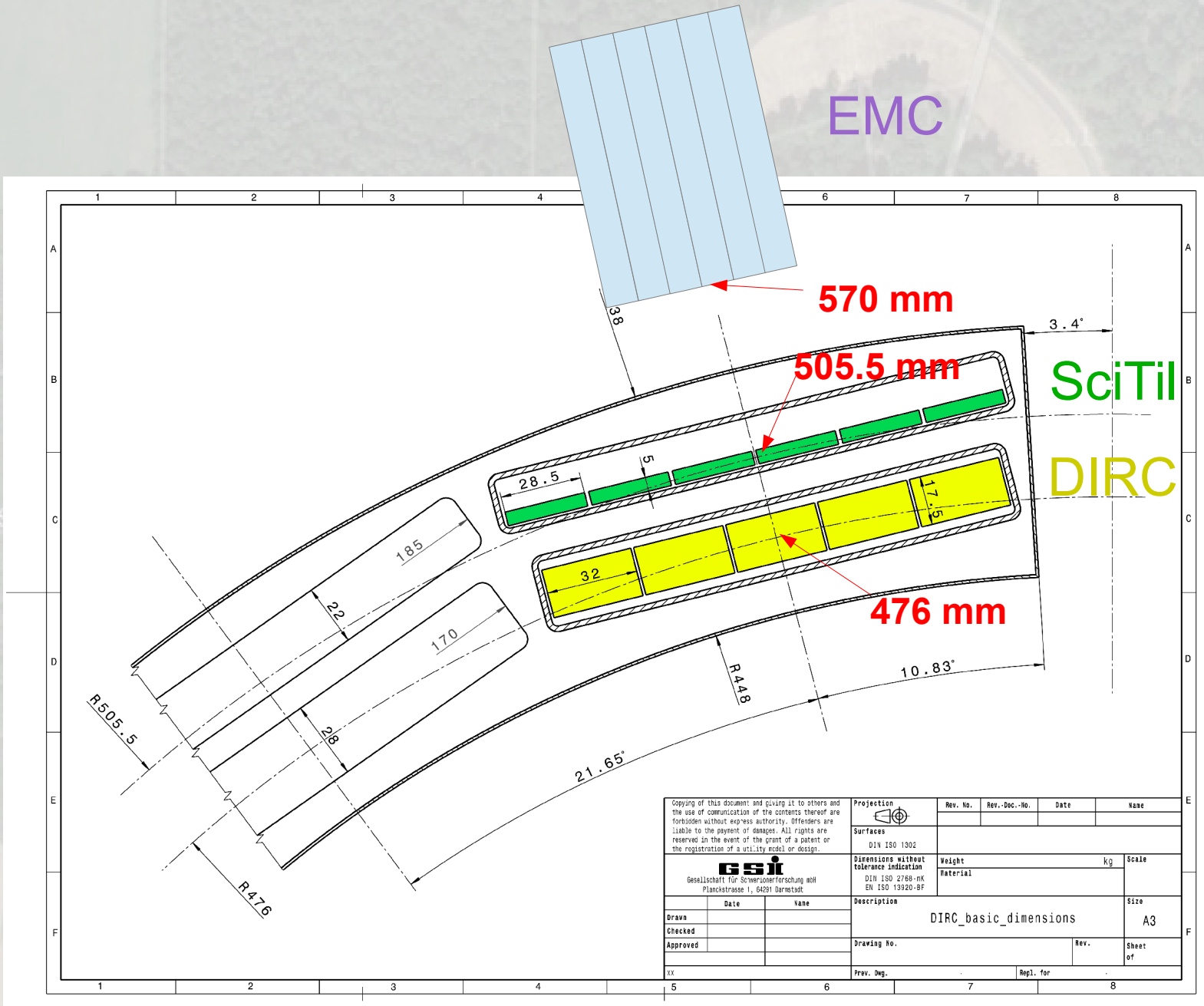
Total

5760 SciTils

16 super modules
outside of DIRC barrel

Cooled by dry air





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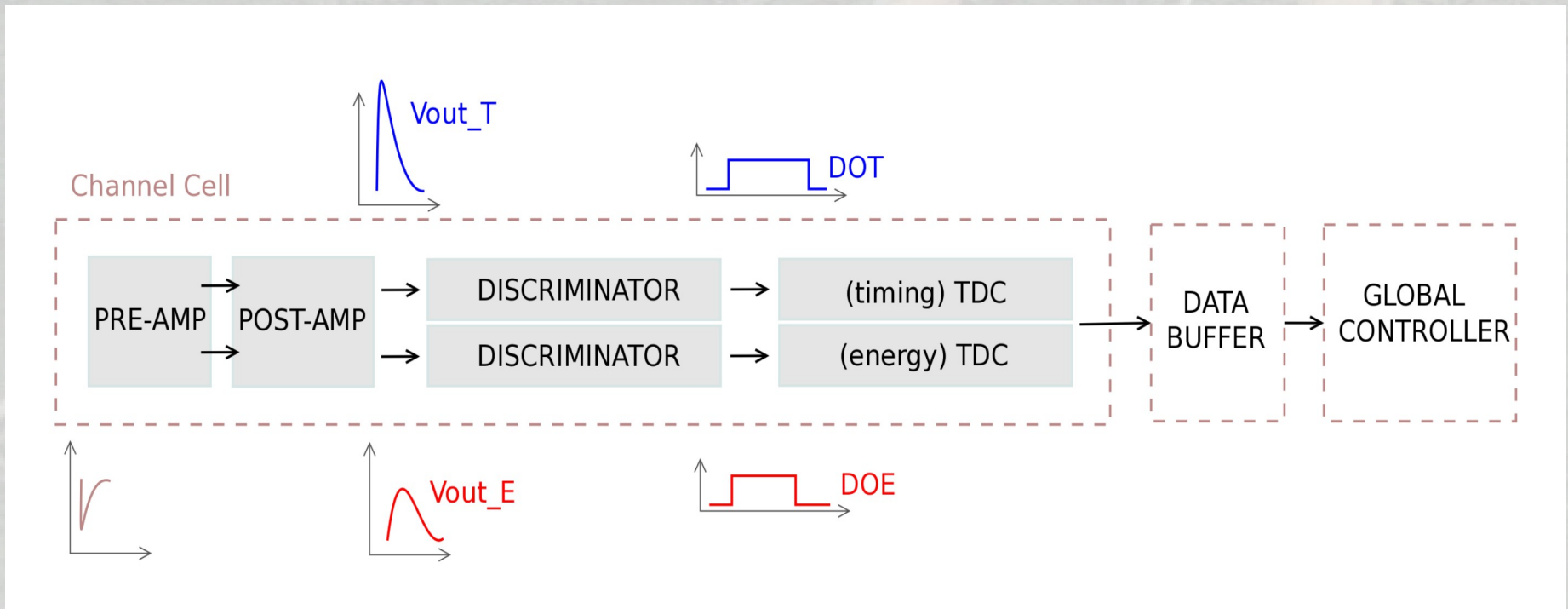
GSI
Gesellschaft für Schwerionenforschung mbH
Planckstrasse 1, 64291 Darmstadt

Projection	Rev. No.	Rev.-Dec.-No.	Date	Name
Surfaces	DIN ISO 1302			
Dimensions without tolerance indication	Weight	kg	Scale	
DIN ISO 2768-mk	Material			
EN ISO 13920-BF	Description		Size	
	DIRC_basic_dimensions		A3	
Drawn	Date	Name	Drawing No.	Rev.
Checked				
Approved				Sheet of
xx			Prev. Dwg.	Repl. for

ASIC for SiPM readout

TOF-PET ASIC for PET applications

M.D. Rolo JINST 8 C02050



Per channel:

100 kHz

7 mW

12000 tiles: → 84 Watts

2nd threshold

validation of events (i.e. dark count rejection) and provision of a second time stamp for TOT

→ development board now commercial available (Mach 2014)

Results of test beam time in Juelich, Feb. 2014

Ken Suzuki:

With analog SiPM, with a preliminary online analysis, we reached almost 100ps (sigma) intrinsic time resolution.

With a careful offline analysis we'll probably reach 100ps, one of the goal of the project.

With digital SiPM together with Philips, we reached an astonishing <50ps (sigma) intrinsic time resolution.

More will be reported at the next PANDA meeting.

Work packages

Work package	Interested institutes
Simulation	BARC
Module design	GSI, BARC construction
Scintillator	Dubna, Gatchina R&D
Silicon PM	EU HP3, BARC, Dubna, Gatchina
Readout design	EU HP3, BARC
Mechanical design	GSI
Prototype production	BARC

Status: DAE - BRNS Workshop on Hadron Physics – 2011

**R&D: Vienna, Mainz, Erlangen for R&D with test stands
Vienna, GSI, Experiments in beam**

Work Package	Interested Institutes
SiPM test facility	BARC

construction

R&D

Prototype

Electronic readout (TOF-PET)

>1year

Testing and documentation of 12000 sensors

Dark current

Bias

Temperature dependence of bias

>1year

Testing and documentation of 6000 tiles

Material

Coupling of sensors

Assembly of 6000 tiles

tiles

electronics

PANDA - India Present Status

Bidyut Roy

(on behalf of Panda - India collaboration)

Present Members (PANDA-India Collaboration)

BARC, Mumbai
IIT Bombay, Mumbai
AMU, Aligarh
BITS-Pillani, Goa campus, Goa
Gauhati university, Gauhati
IIT Indore, Indore
Sardar Patel univ., Vallabh Vidyanagar,
Sardar Vallabhbhai National Inst. of Tech., Surat
Veer Narmad South Gujrat univ., Surat

P. D. Patel Inst. of Applied Science, Anand
(in Theory Advisory Board)

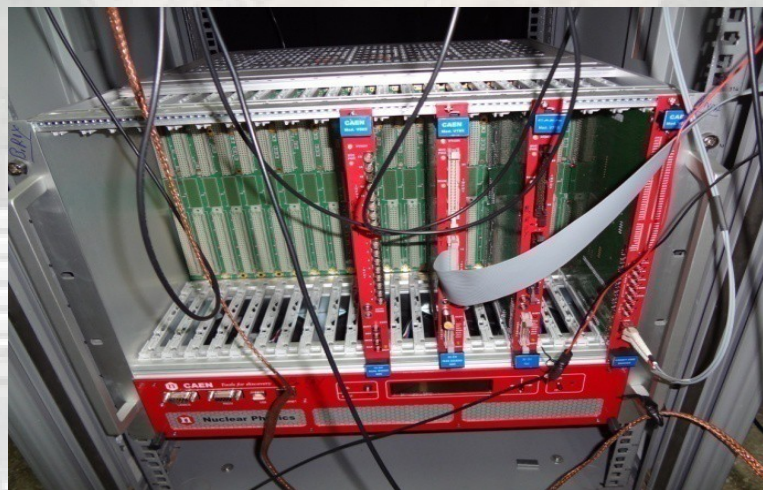
Membership applied:

- > Visva bharati univ,
- > B.R. Ambedkar National Inst. of Technology

On SciTil work:

- Gauhati University got DST fund, one JRF has been appointed
- AMU Aligarh got BRNS fund + 1 JRF being appointed
- Visva Bharati got BRNS fund, 1 JRF being appointed

SiPM / SciTil test facility at BARC



Most of the necessary equipments are purchased and Setup ready, initial R&D work being carried out.

SciTil Status, B.Roy Mach 2014

12

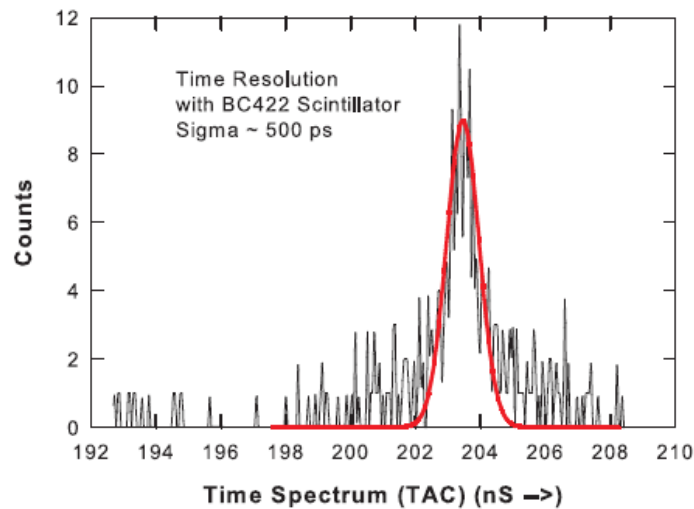


Figure 7: Time spectrum (TAC output) obtained in the time resolution study with the plastic scintillator BC-422. A Gaussian fit to the data yielded a time resolution (σ) of 500 pico-seconds

Time resolution ~ 500 ps achieved.
Initial results but very encouraging.
There are ways to minimize the spread/contribution from electronics,
and are being studied. Time resolution ~ 200 ps or better is feasible.

Shifting to a new lab space, which is more or less ready.
Work will resume soon.

Costs

		2011		2014
	device	sum	device	sum
Tile	25	140k	25	145k
SiPM	30	330k	90	1060k
Readout	20	220k	50	590k
Mechanics		50k		53k
Total		740k		1848k

Costs driven by SiPM prices in India
SiPM prices in Europe go down

Conclusions

- R&D / test in beam done by
 - Vienna, Mainz, Erlangen
 - 100ps is reached
- Construction planned in India
 - SiPM infrastructure is setup at BARC
 - Critical mass of man power not yet reached
- Cost increase due to expensive SiPM in India
 - Funding?