

# DIRC Prototype Test at MAMI

PANDA XLVI. Collaboration Meeting

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# Outline

- First DIRC Prototype Test at MAMI
  - First qualitative Results
- Tasks of the second beam time
- Second DIRC Prototype Test at MAMI
- Data pre analysis
- Summary and Outlook

# Reminder: First DIRC Prototype Test at MAMI

PANDA XL. Collaboration Meeting in March 2012

## Timing

### Setup

- One Fused Silica Bar (HxWxL: 35x17x800 mm)
- One MCP Burle xp85012
- Bar and MCP in direct contact coupled with oil (Marcol82)
- One Scintillator as Trigger (behind bar)
- New FEE + TRBv3 readout

Time differences	Calculated [ps]	Measured [ps]
$\Delta\text{ToF}_{0^\circ-30^\circ}$	936	$654 \pm 250$
$\Delta\text{ToF}_{0^\circ-48^\circ}$	1580	$1780 \pm 400$
$\Delta\text{ToF}_{30^\circ-48^\circ}$	641	$1130 \pm 430$

### Conclusions

- DIRC prototype can be tested at MAMI
- We were able to see Cherenkov Photons
- Effects by changing the incident angle and hit-position are according to our expectations
- Data Acquisition works with TRBv3

## Number of Photons

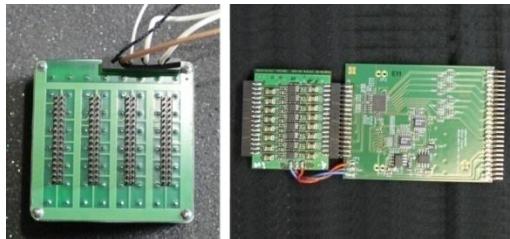
Incident Angle	Calculated Npe	Measured Npe	FWHM/2,355
0°	2,9	1,6	1,0
30°	3,4	3,9	2,1
48°	4,3	7,1	2,6

# Tasks of the second beam time

- Data acquisition with TRBv3 for at least 3 MCPs



- Test of new Front End Electronics



- Imaging of Cherenkov Rings

# Second DIRC Prototype Test at MAMI

## - Setup:

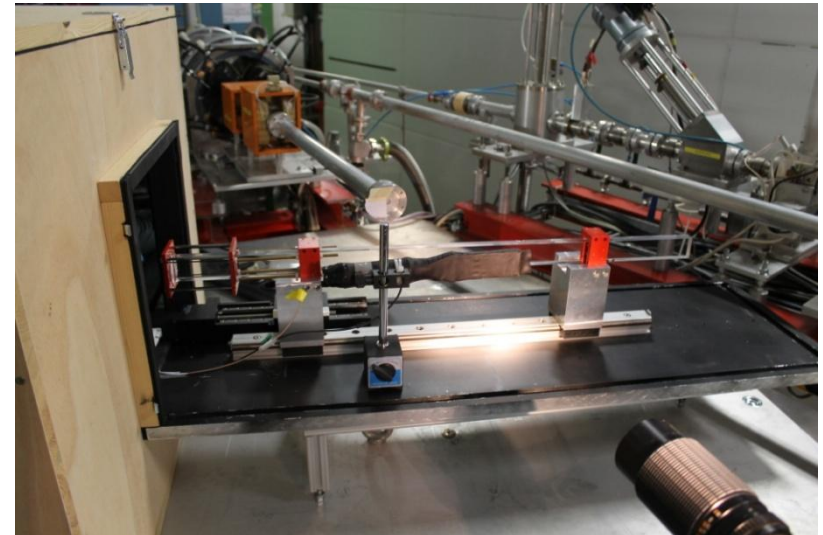
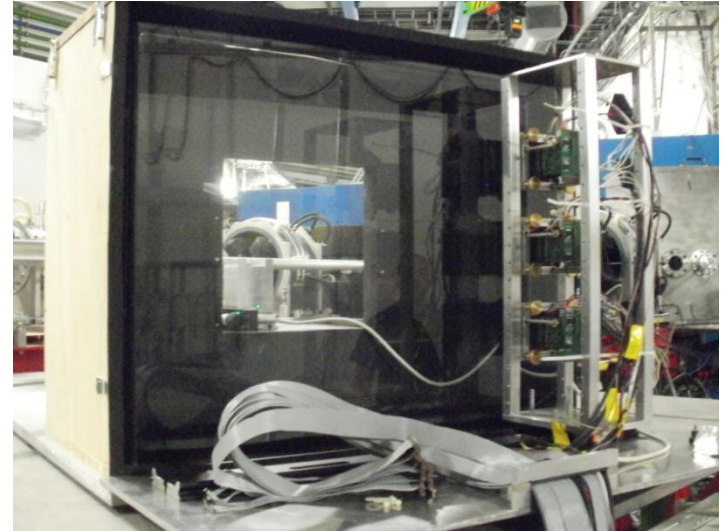
- Bar
  - + Planoconvex Lens ( $f = 250$  mm;  $d = 50$  mm)
  - + Expansion Volume (80 cm x 60 cm x 30 cm)
- 3 MCPs Array  $\rightarrow$  Imaging

## - Optical Contact:

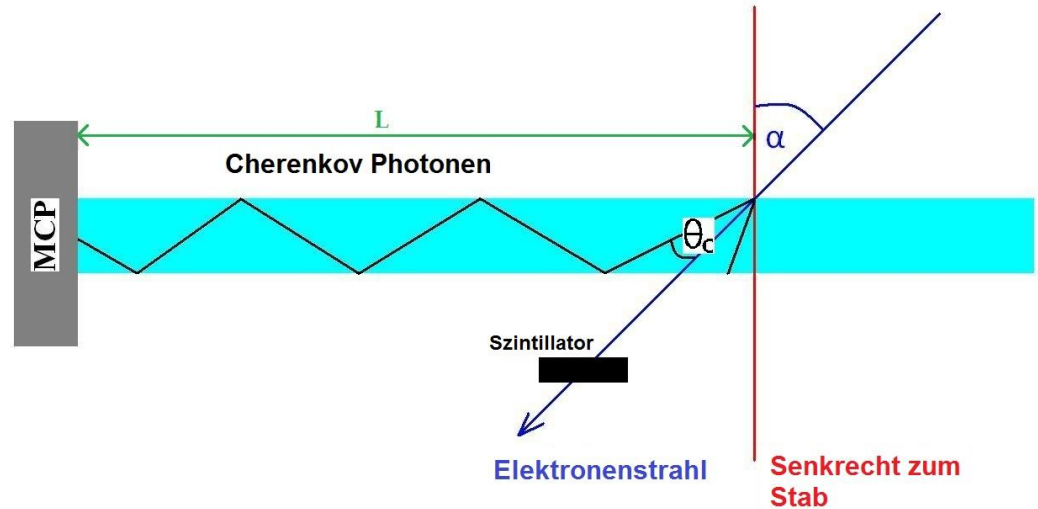
- Bar and lens coupled with Oil
- MCPs and expansion volume coupled with optical grease

## - Readout

- one MCP per TRBv3 board



# What have we measured?

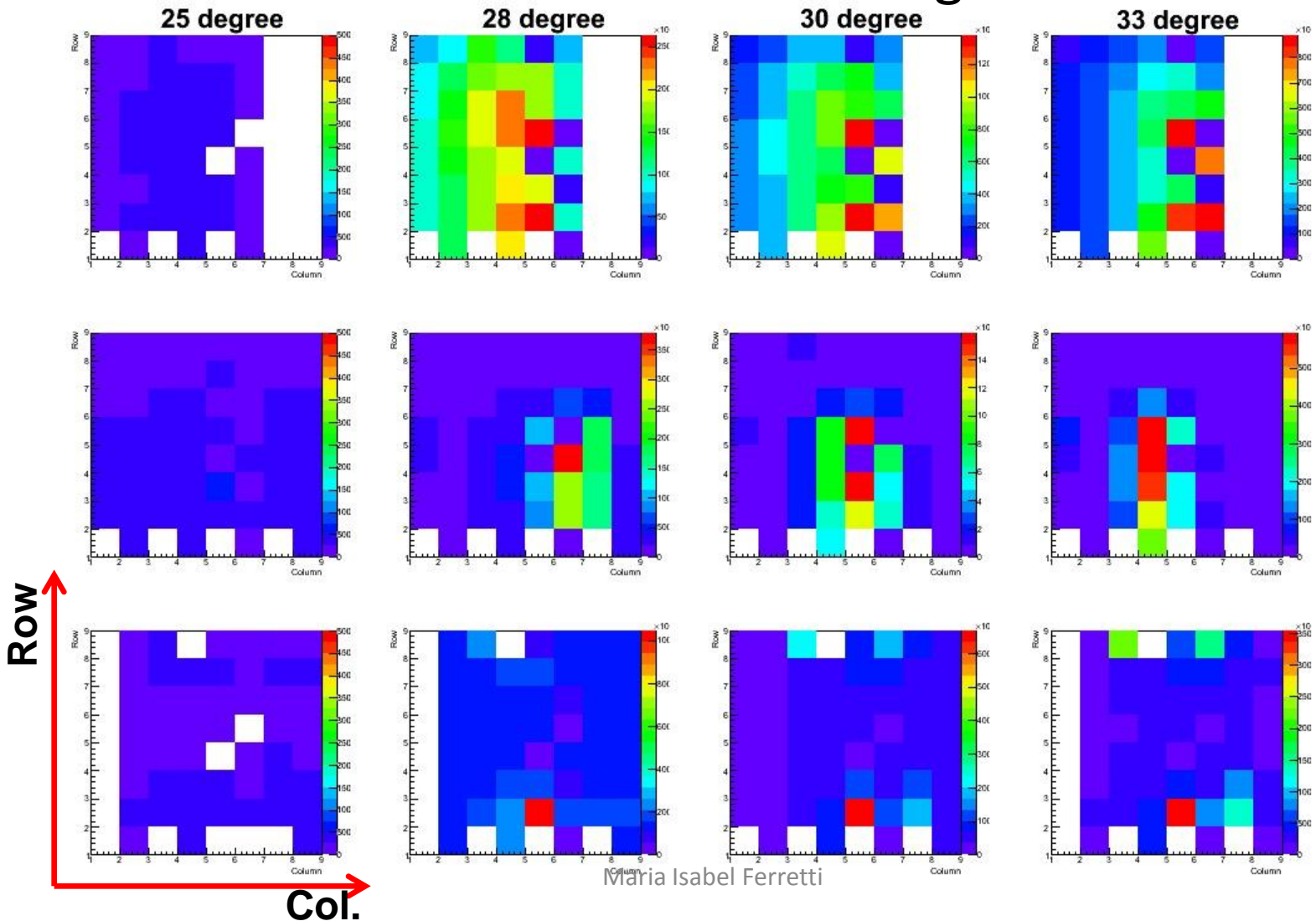


- 3 MCPs with 3 TRBv3 Boards
- Triggerles (CTS)
- Different Incident angles
- Different Airgaps

Incident Angle	dgap [cm]
$25^\circ \pm 1$	$10 \pm 0,5$
$28^\circ \pm 1$	$10 \pm 0,5$
$30^\circ \pm 1$	$10 \pm 0,5$
$33^\circ \pm 1$	$10 \pm 0,5$
$30^\circ \pm 1$	$6 \pm 0,5$

# What have we measured?

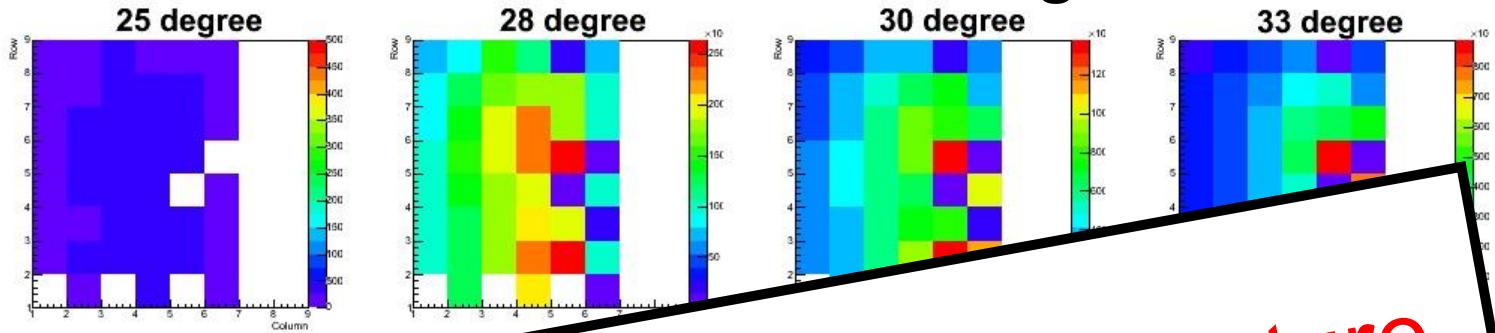
## Different incident angles





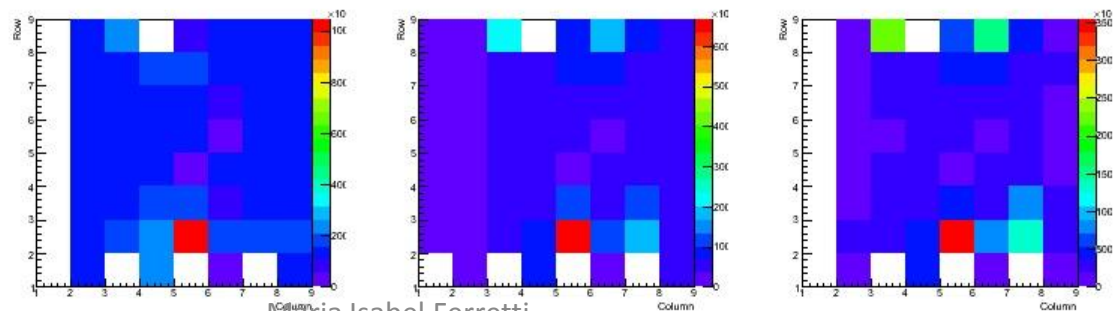
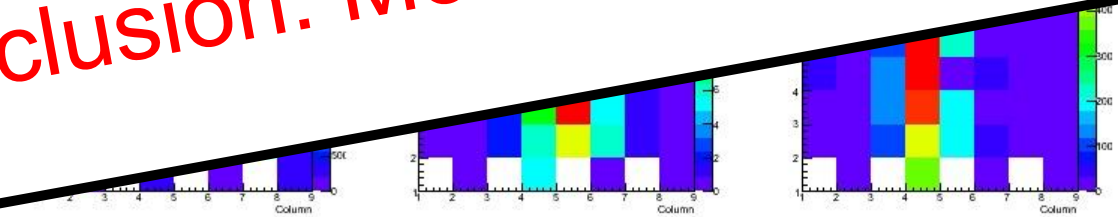
# What have we measured?

Different incident angles



→ Conclusion: Moving Structure

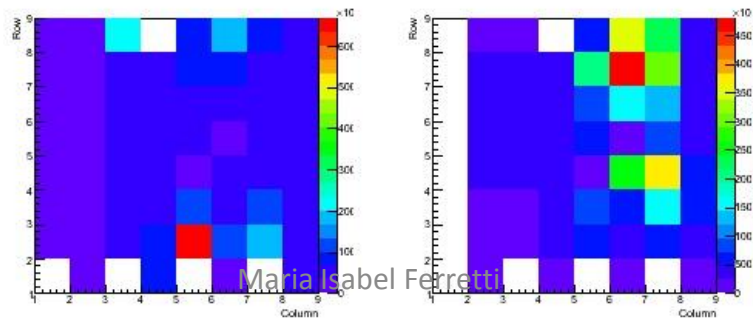
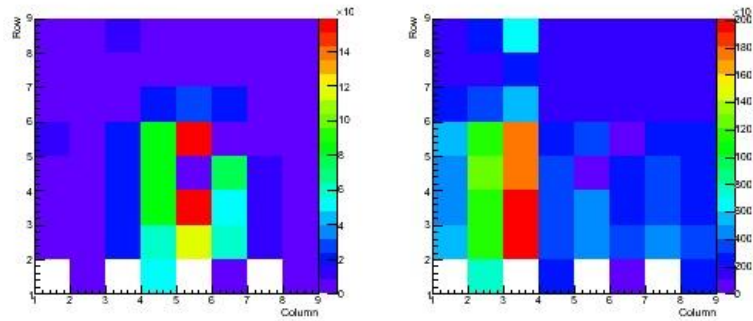
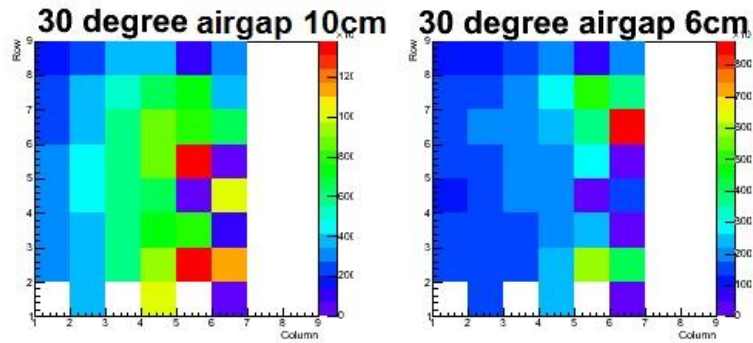
ROW ↑  
Col. →





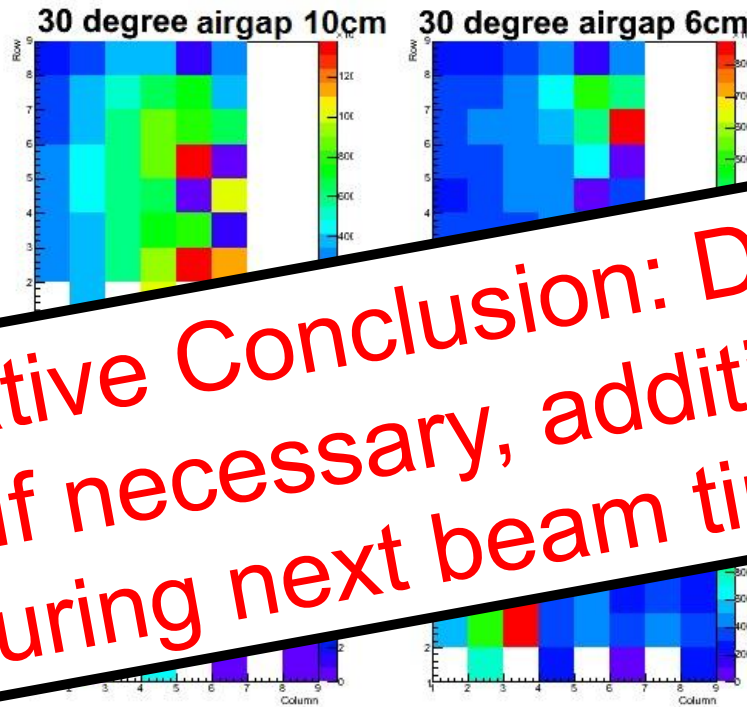
# What have we measured?

## Different airgaps

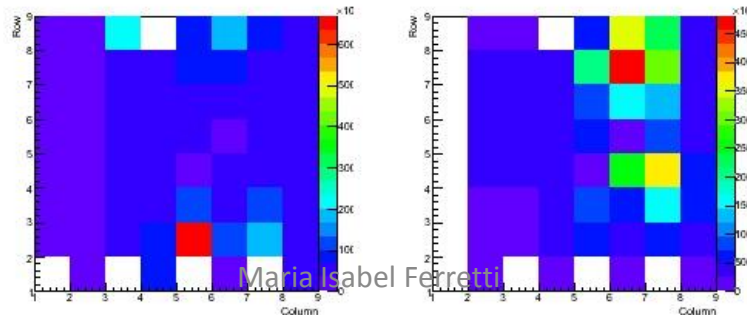


# What have we measured?

## Different airgaps

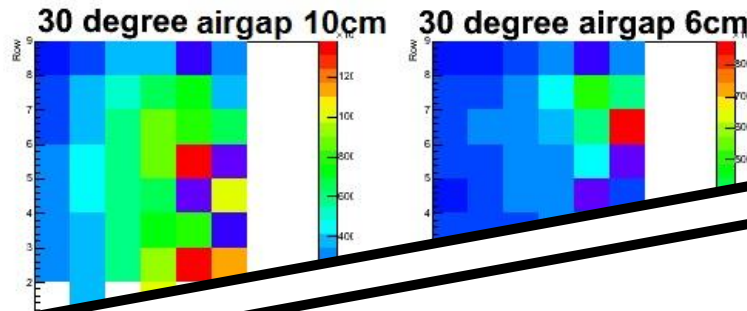


→ Qualitative Conclusion: Defocus at 10 cm. If necessary, additional test during next beam time

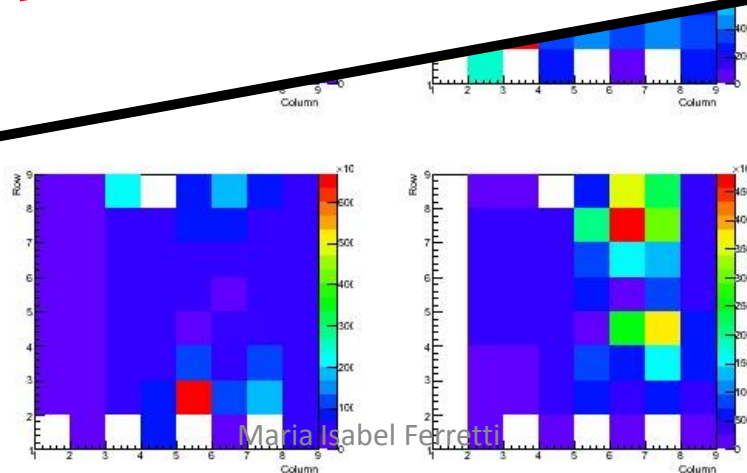


# What have we measured?

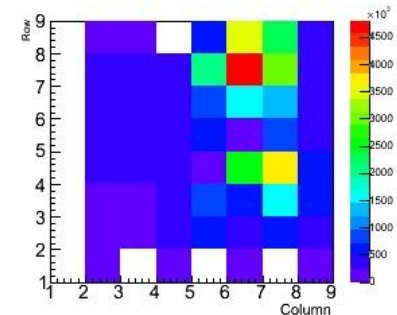
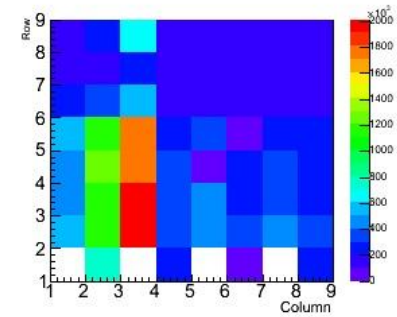
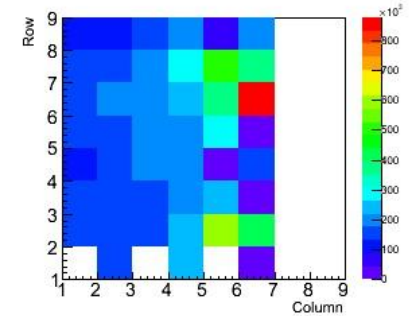
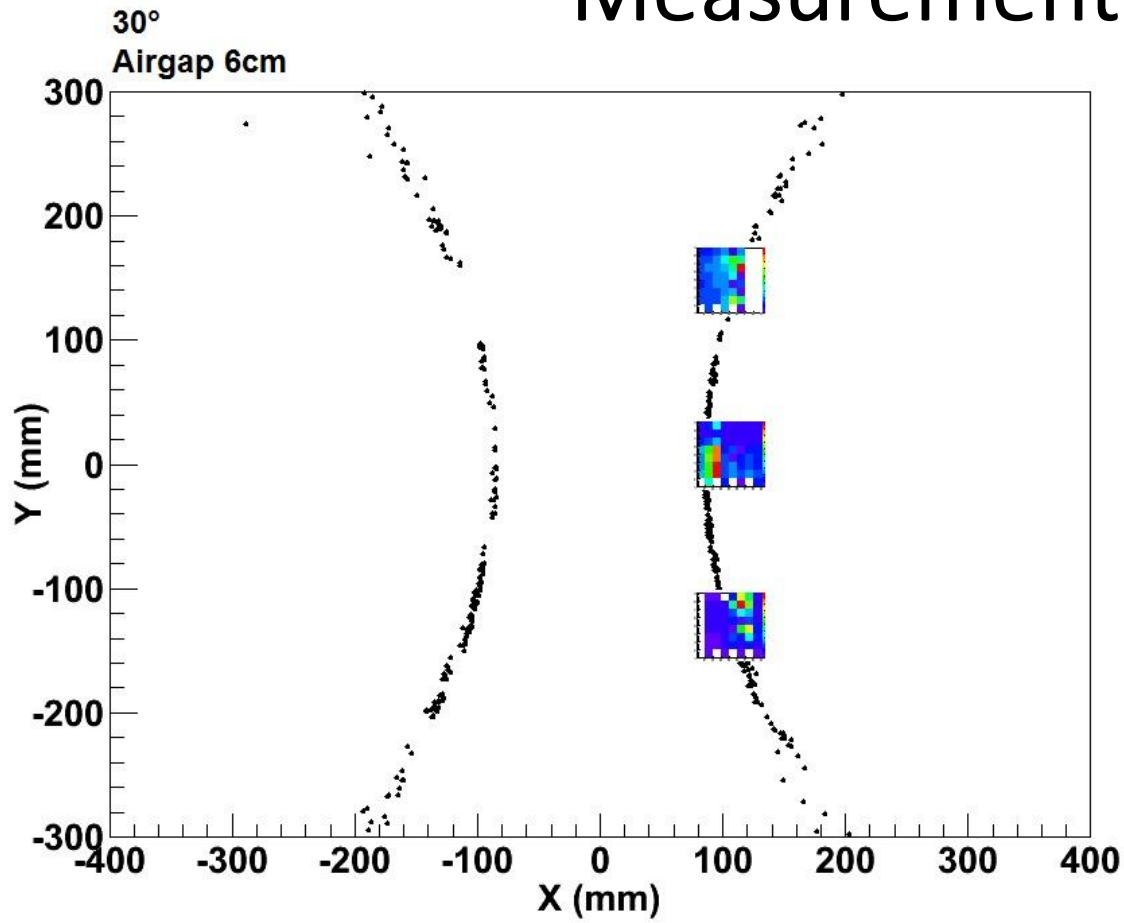
## Different airgaps



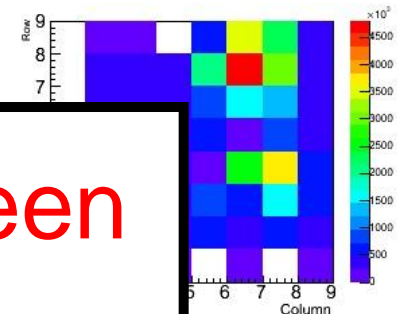
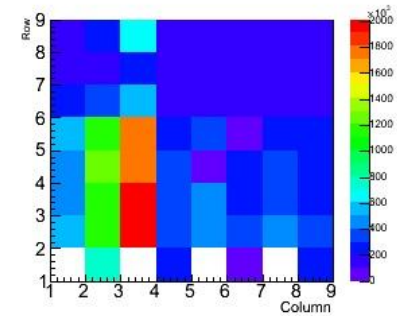
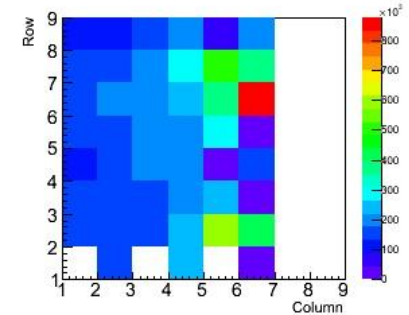
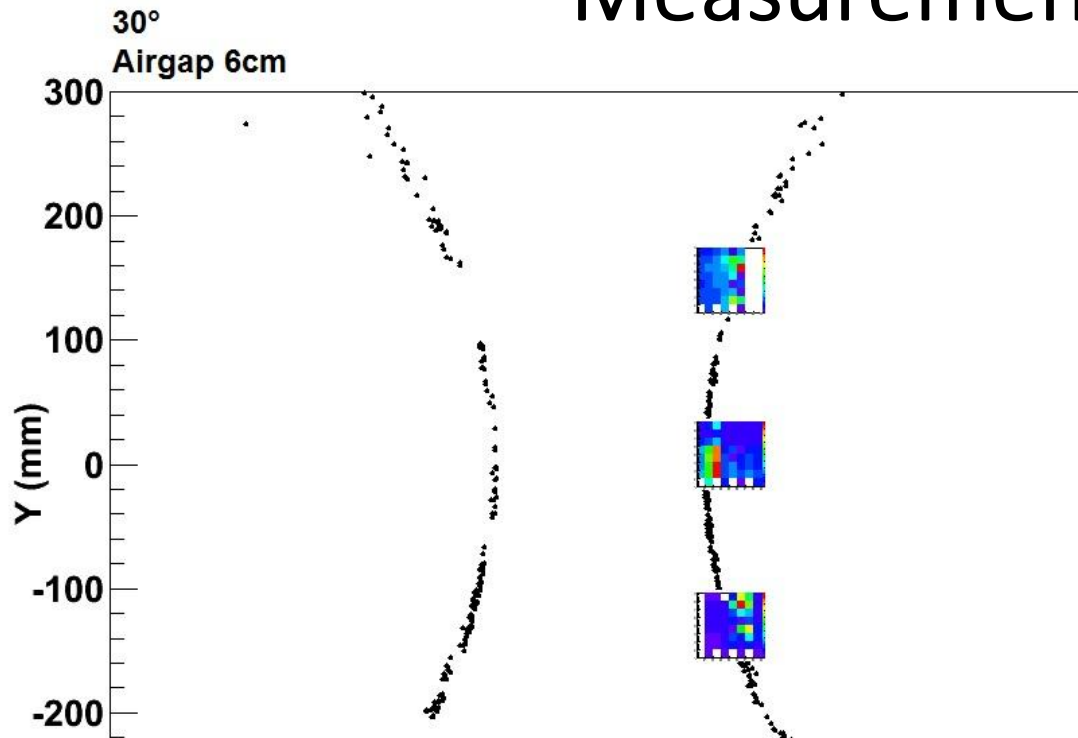
Comparison with Simulation?



# Comparison between Simulation and Measurement



# Comparison between Simulation and Measurement



→ Excellent agreement between simulation and data!!

# Summary and Outlook

- **Summary:**

- DIRC prototype + FEE + TRBv3 successfully tested (4 MCP readout)
- Different configurations tested
- Structure already in online analysis visible
- Qualitative agreement with the simulation

- **Next Steps:**

- TRB data quantitative analysis (# detected photons, time resolutions, Leading&Trailing Edges vs. Amplitude for pulsed beam runs)
  - Unpacker for TRBv3 (HLD Files)
- Feasibility for a test experiment at A1 (PID capabilities)
  - New optics and readout volume to facilitate handling (waiting for first results of CERN Beamtime)
- Ongoing TRBv3 development
  - Increase of readout channels per TRBv3 Board
  - Leading&Trailing Edges measurements in same channel
- Electronic development
  - Integrators on board (Charge over Threshold, first test with new FEE prototype foreseen for  $\approx$  end of the year)

# Thank You!!

