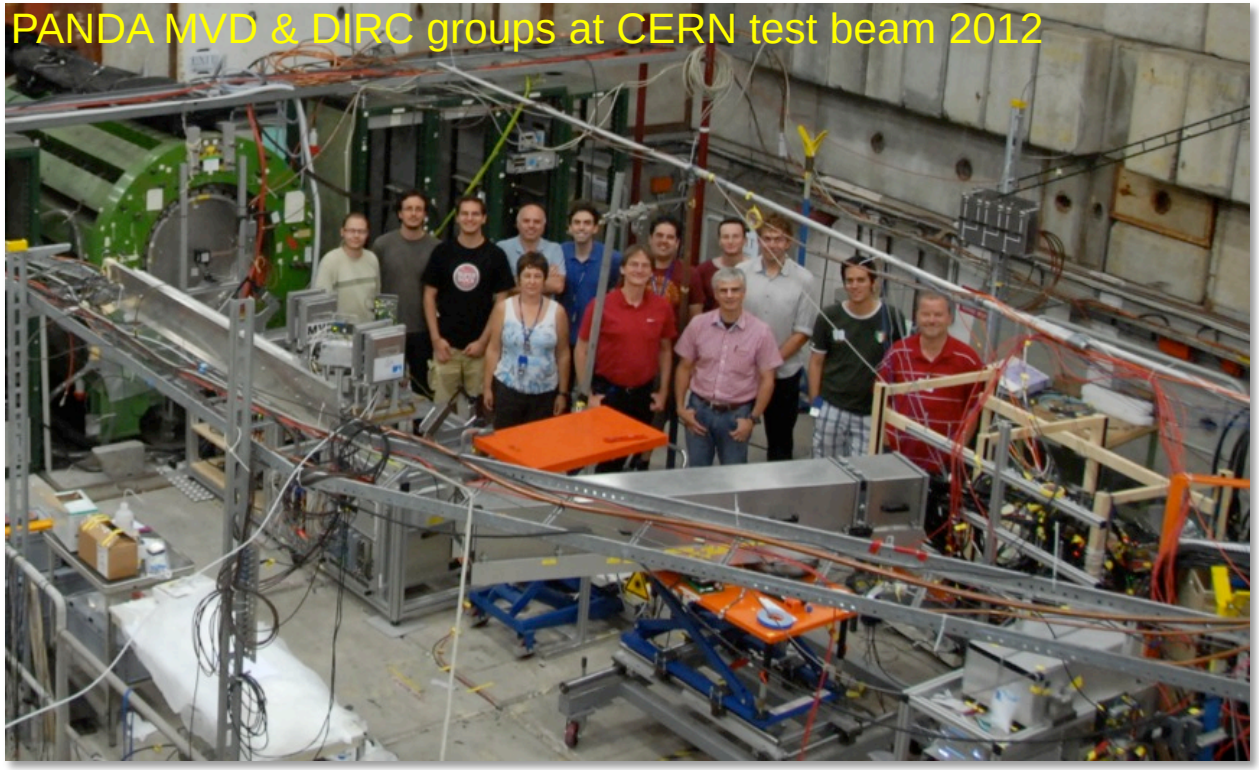
PANDA BARREL DIRC

T9 TEST BEAM

AUG 10 – SEP 3, 2012



Test beam ended about one week ago, so today: just some pictures

On behalf of the DIRCies who were at CERN for the test beam:
Erlangen: Albert, Alex, Fred
GSI: Andreas, Carsten, Doro, Georg, Greg, JS, Maria, Marko

PANDA BARREL DIRC PROTOTYPE 2012

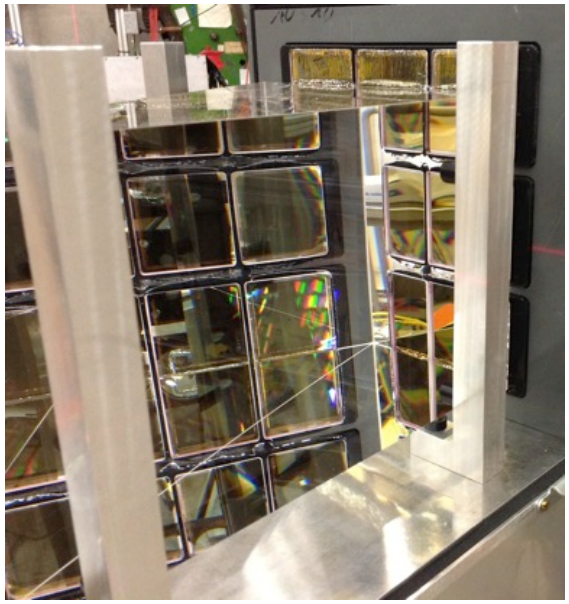
Goal:

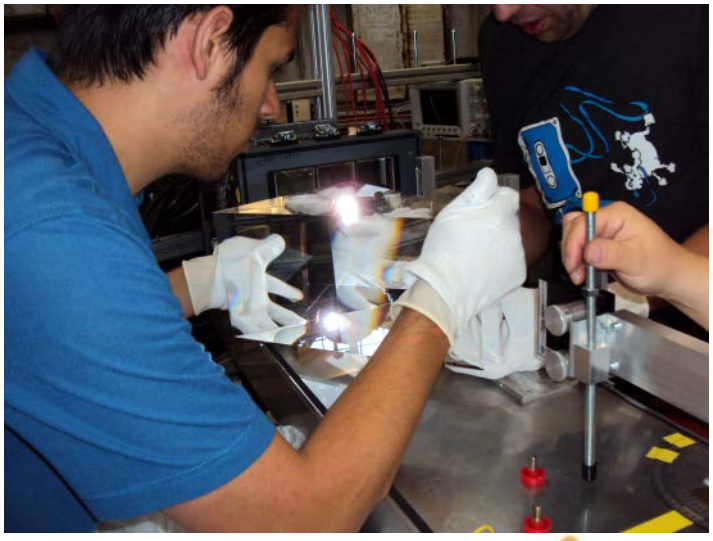
Verify design concepts in particle beam at T9

→ Cherenkov angle resolution, photon yield,
π/K/p particle identification

Top priorities in 2012:

First look at prism as compact expansion volume,
plate as an alternative to bar geometry.



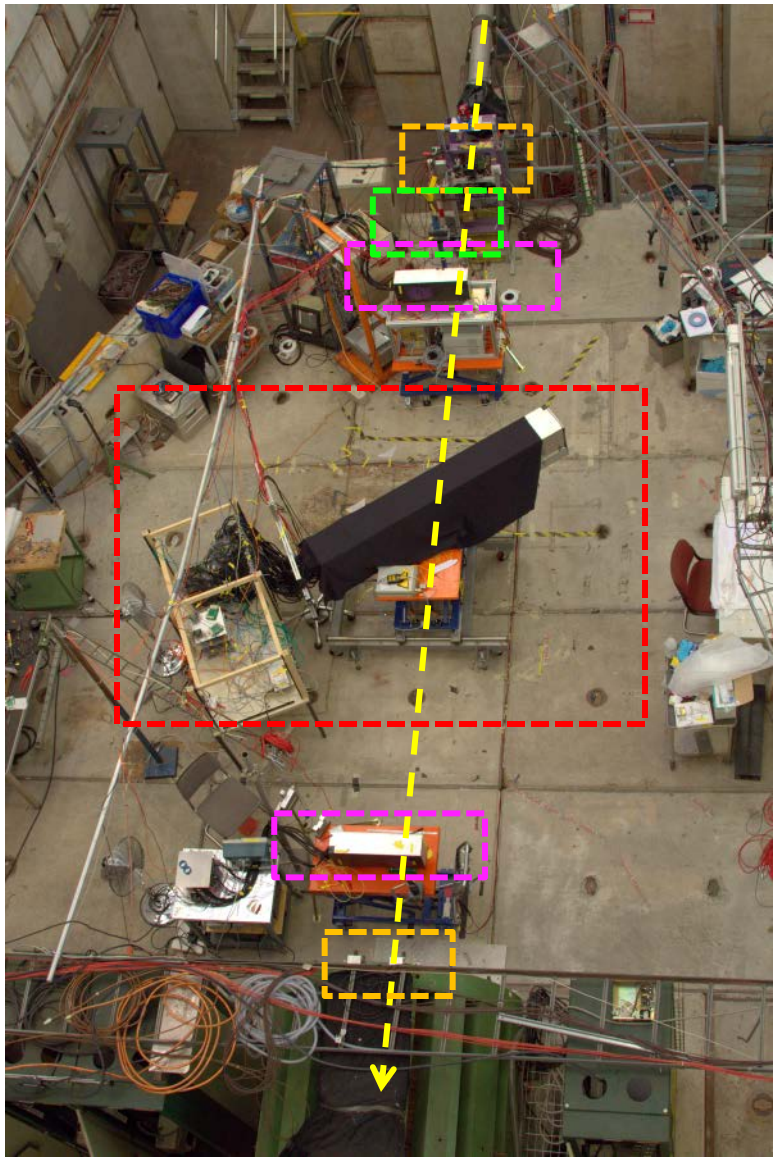


PANDA PROTOTYPES 2012

T9 area after CLAS12 departure
on Friday, Aug 10, 11am

T9 area a few hours later:
all prototypes installed,
ready for first beam

PANDA PROTOTYPES 2012



Cave layout on Aug 21.

MCP-TOF station 1&2 *(Erlangen)*

SciTil

Fiber Tracker station 1&2 *(Mainz)*

Barrel DIRC

Aug 8: pre-assembly in storage area behind T9.

Aug 10: move prototypes into T9, safety approval.

Aug 10-20: all prototypes taking data.

Aug 20: MVD completes program, prototype removed from T9, DIRC setup rearranged.

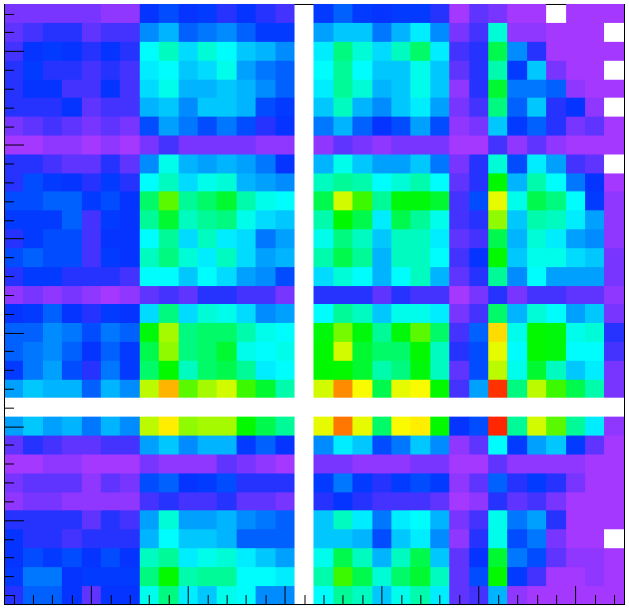
Aug 20-Sep 3: DIRC, TOF, SciTil continue run.

Sep 3, 11am: End of run.

Barrel DIRC wrote ~220M triggers to disk.

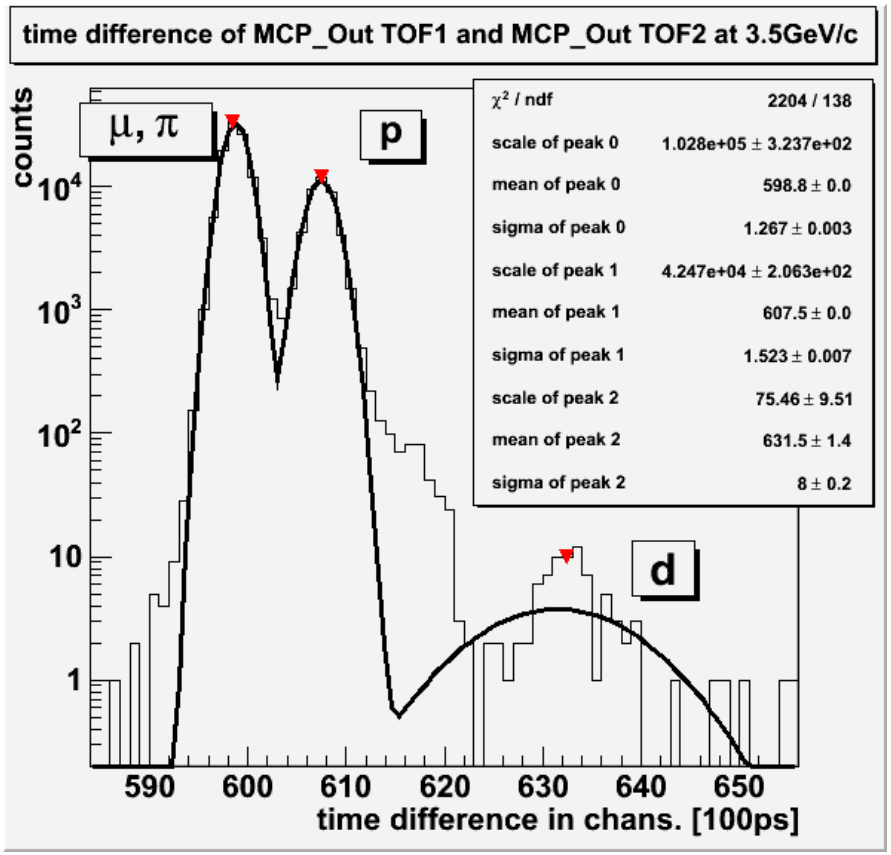
Thanks to our MVD colleagues for the excellent cooperation.

PANDA PROTOTYPES 2012



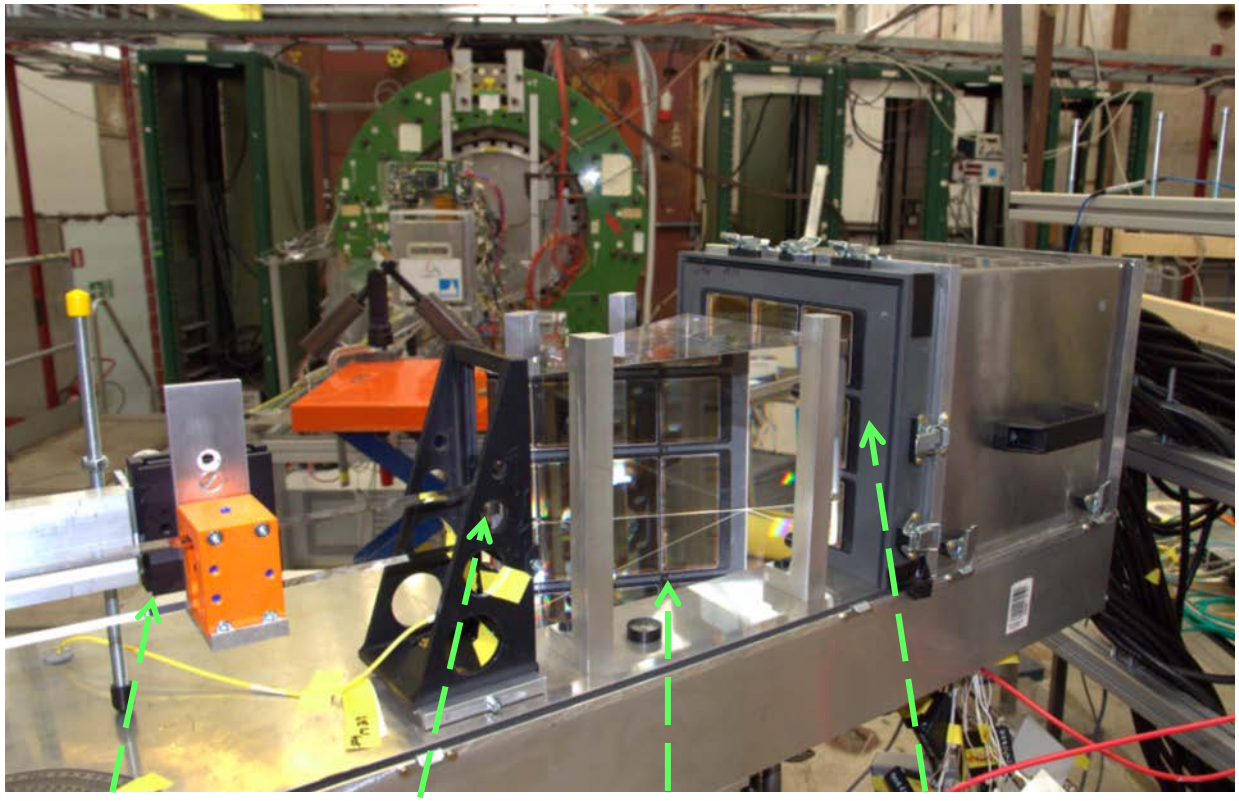
Online hit map from fiber tracker

→ 3D tracking for DIRC,
reduce error on track angle,
correct beam divergence



Time of flight information using two MCP-PMTs,
particles producing Cherenkov light
on small radiator block and inside MCP
→ low-momentum PID, enhance rings in DIRC

PANDA BARREL DIRC PROTOTYPE 2012



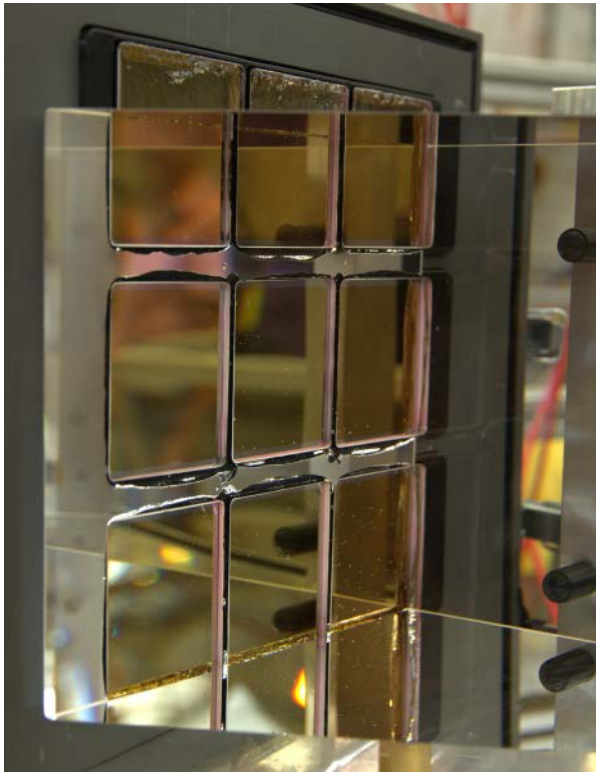
Bar

Lens

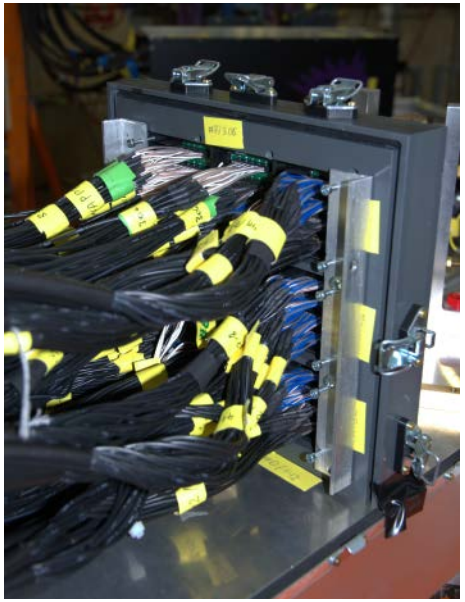
Prism
17x20x30cm^3

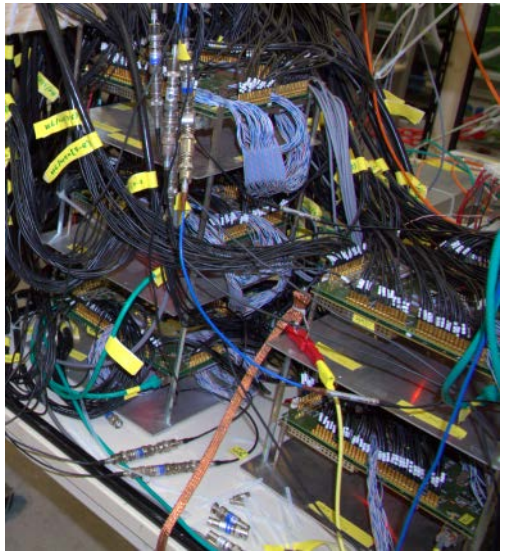
9 MCPs

Prism coupled to MCP
with EJ-550 grease



PANDA BARREL DIRC PROTOTYPE 2012



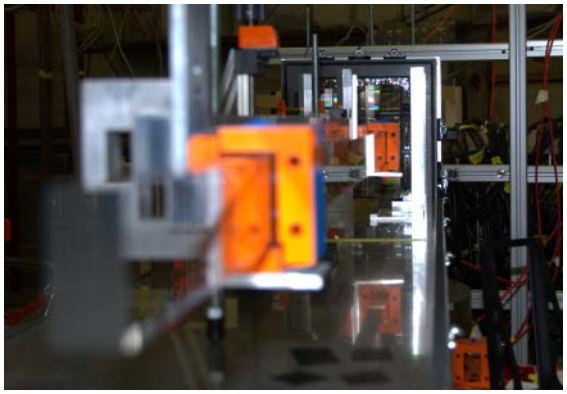


DIRC rings imaged onto
9 Planacon MCPs (576 pixels)

Total of 896 channels in DAQ
(7 TRBs with TOF addOns)

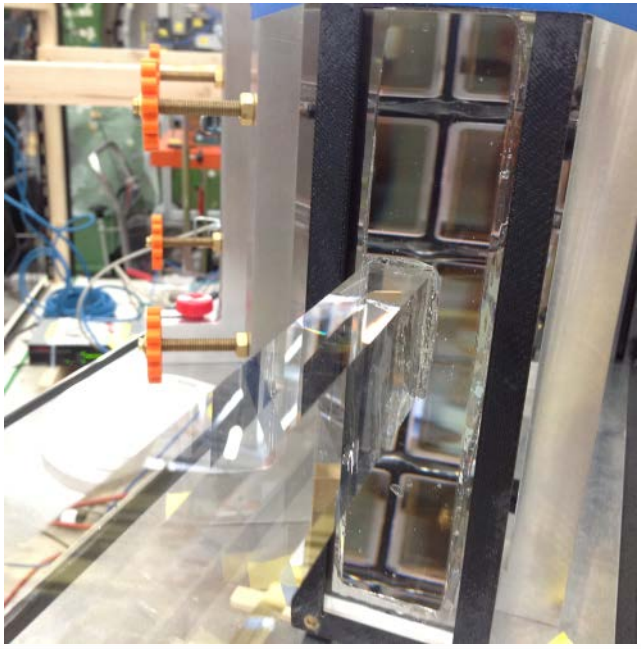
Thanks to our HADES colleagues for help with the DAQ.

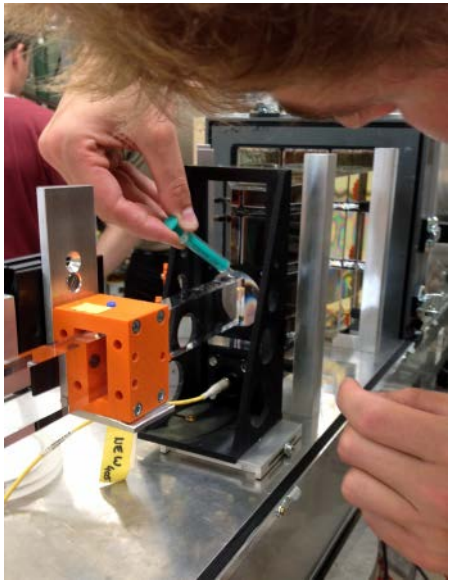
PANDA BARREL DIRC PROTOTYPE 2012



Bar coupled to A/R coated
spherical lens
with grease and
with matching liquid

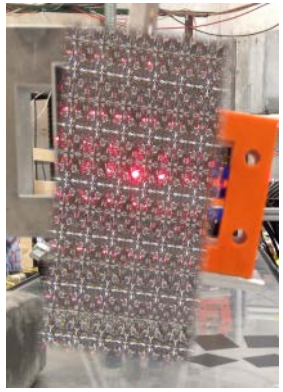
Bar and lens coupled to high-refractive index
cylindrical compound lens (works without air gap)

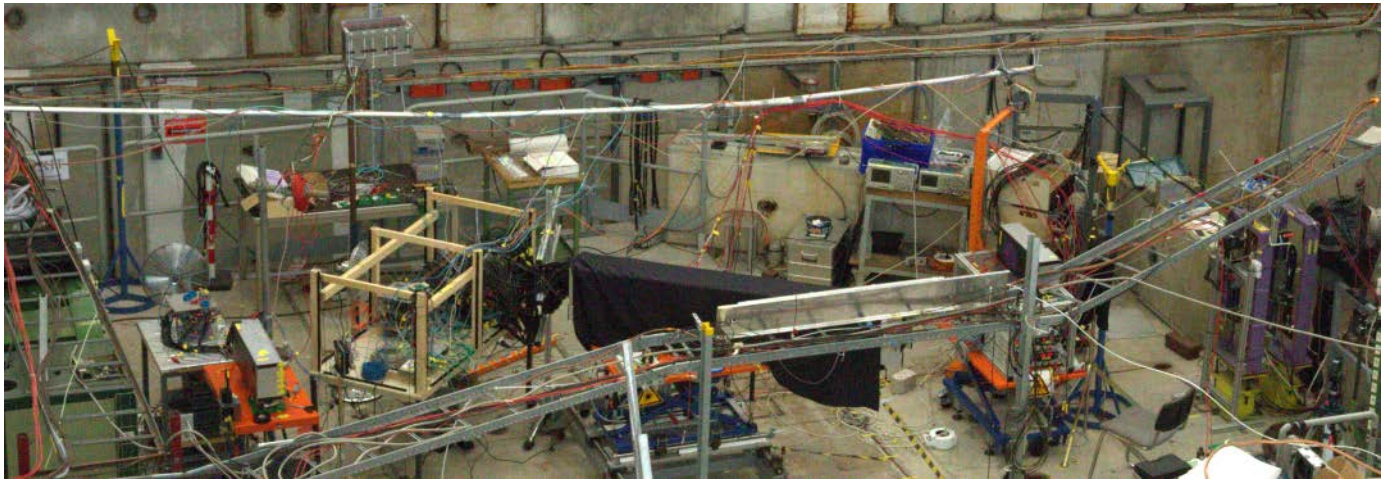


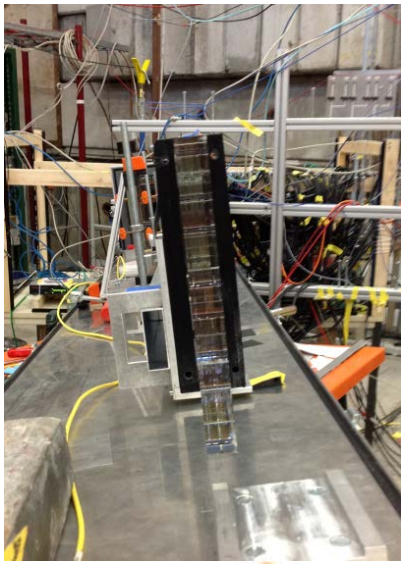


Varied many critical parameters

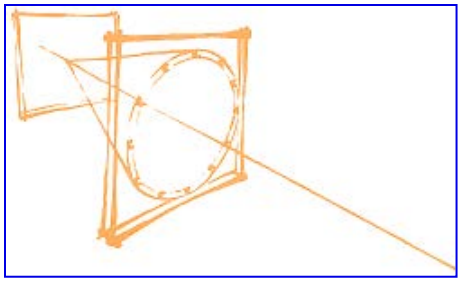
- Plate vs. bar
- Lens types and coatings
- Bar manufacturer (InSync, LZOS, Zeiss, Lithotec)
- Beam momentum
- Polar angle of beam to bar/plate
- Beam position (x&z) on bar/plate
- Fused silica vs. acrylic
- Positioning of bar/plate on prism
- Azimuth angle of beam to bar/plate
- and more…

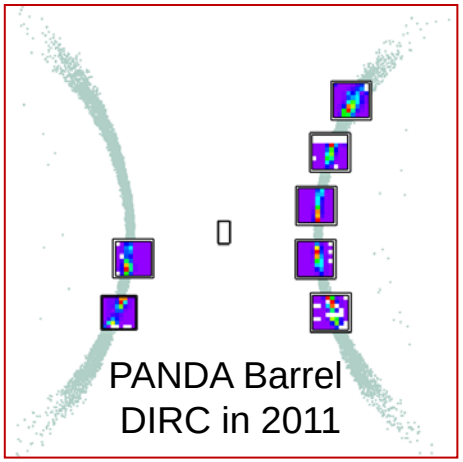


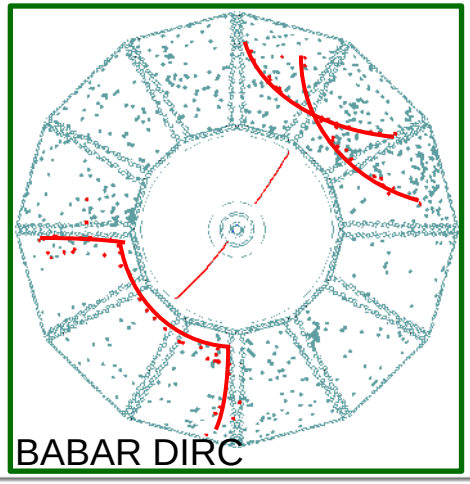




PANDA Barrel DIRC Prototype 2012







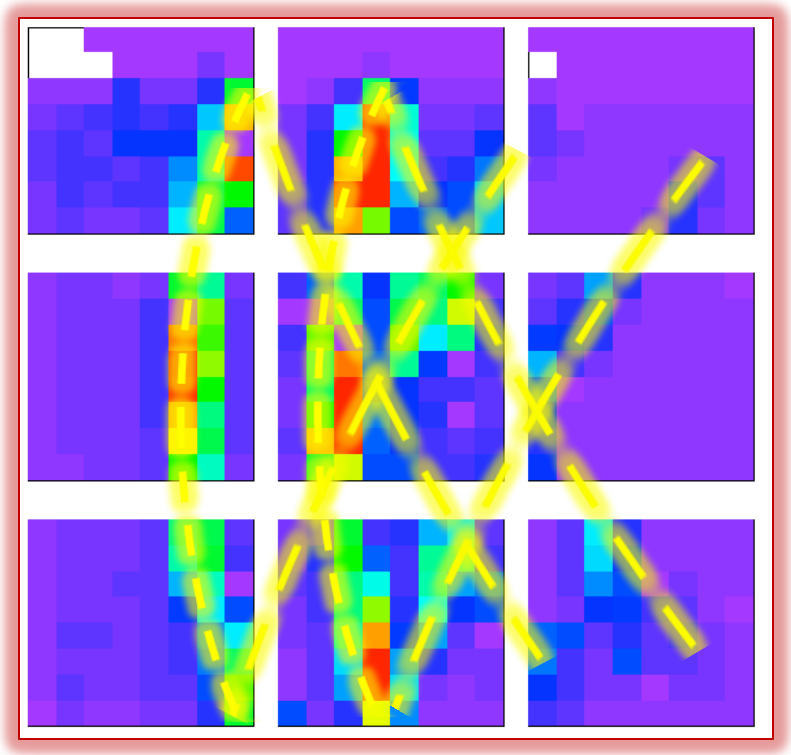
DIRC hit patterns do not look like your typical RICH detector

Ring image gets folded due to propagation in bar/plate

Part of the ring escapes, not totally internally reflected

→ broken rings, complex, disjoint images

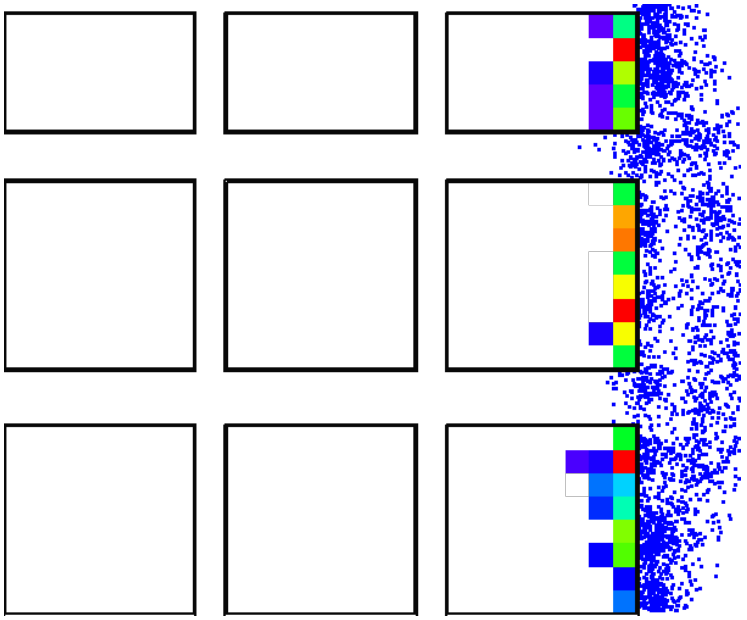
What do we see in 2012 with the prism?



"Fishes"

PANDA BARREL DIRC PROTOTYPE 2012

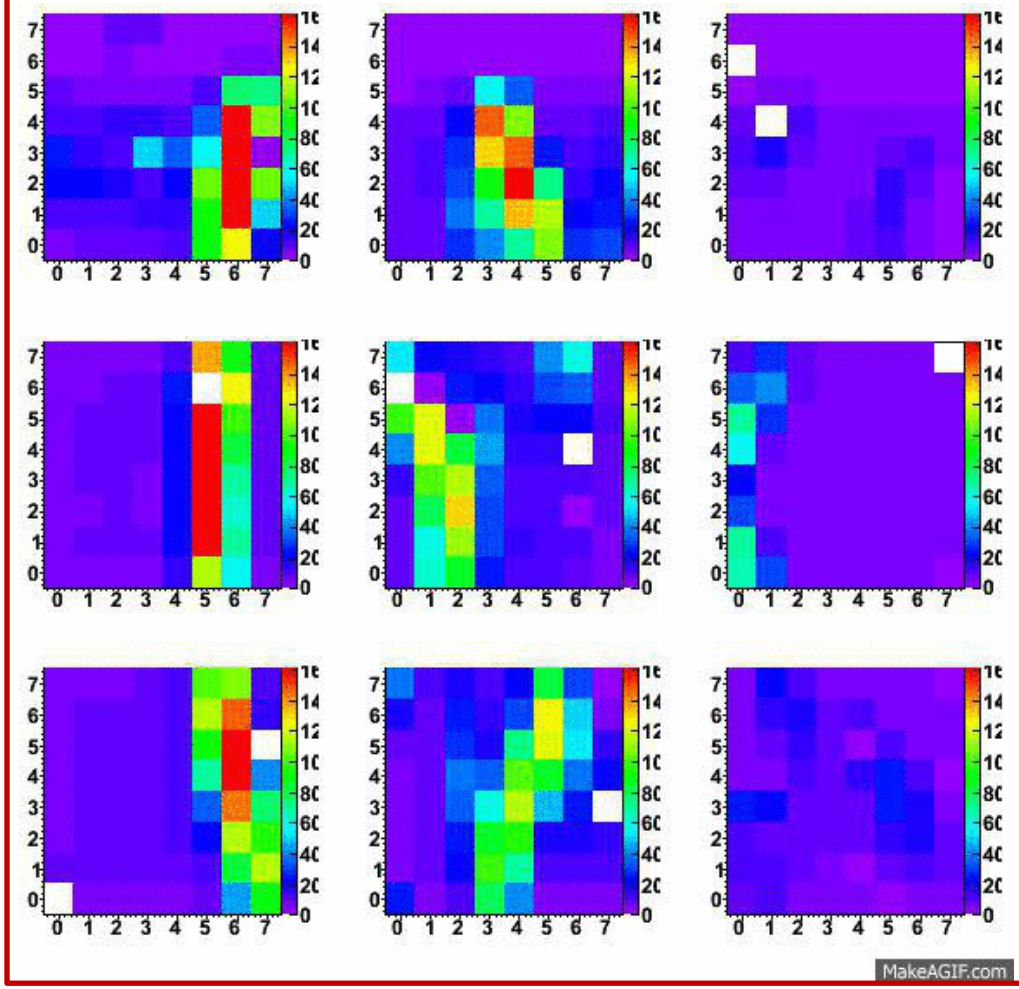
Simulation: polar angles 20-80 deg



dots: photon hit position; histogram: pixel occupancy

(Sorry, Greg's "swimming fishes" animated gifs work only in ppt version of talk.)

Data: polar angles around 55 deg



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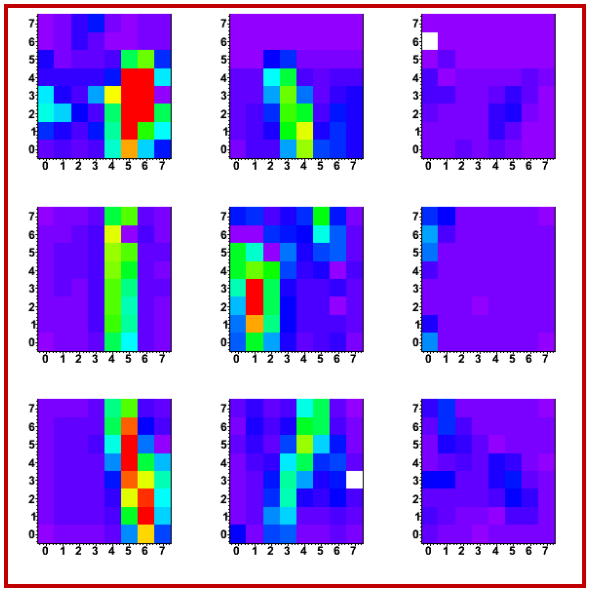
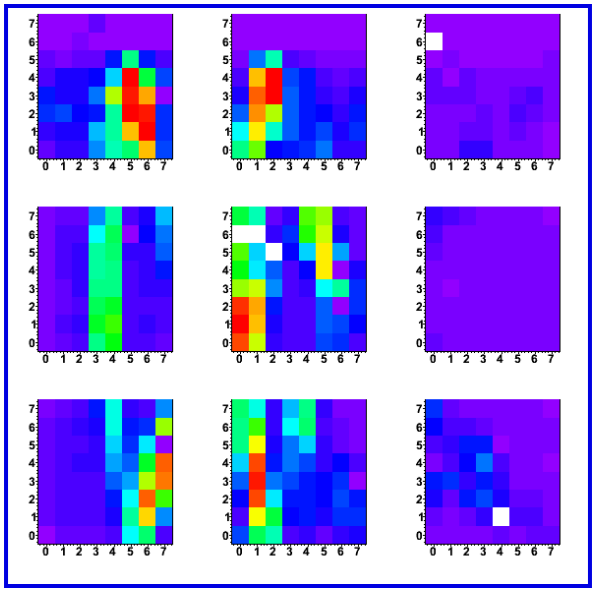
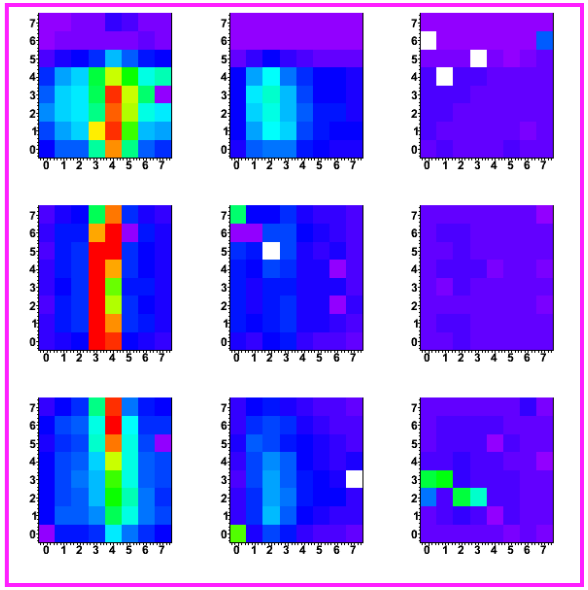


InSync bar



LZOS bar



InSync plate

220M triggers with many interesting parameter changes.

Very rich data set, lots of work ahead.

Hope to have first results for talk at IEEE NSS 2012 on Oct 31st – stay tuned…