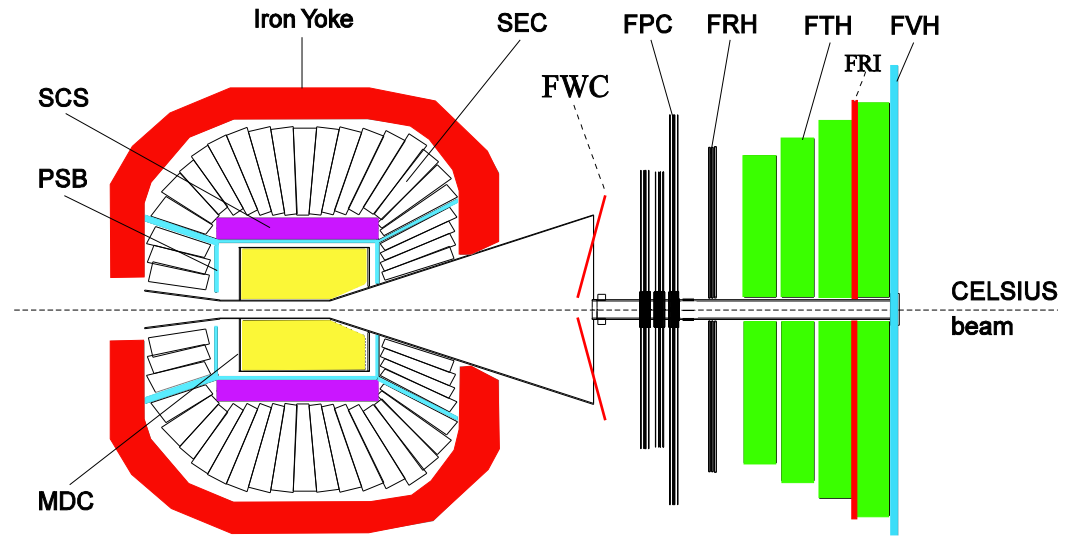
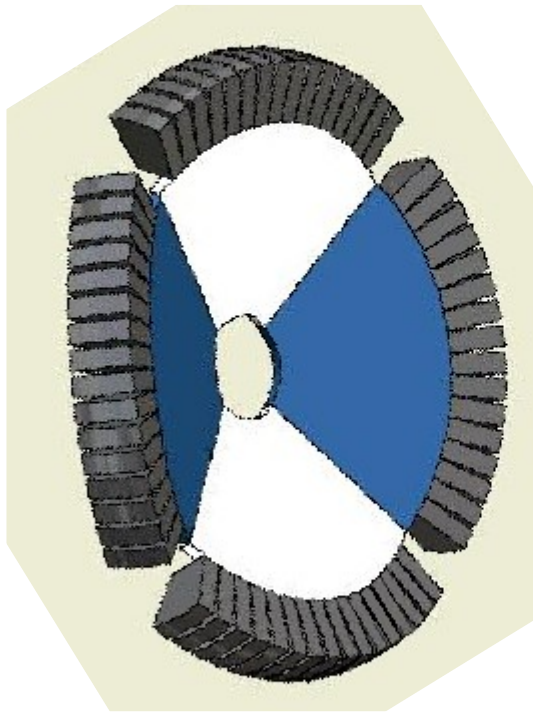
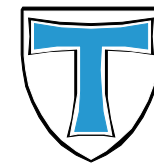


The WASA prototype – *Iteration 2*



JUSTUS-LIEBIG-
UNIVERSITÄT
GIESSEN



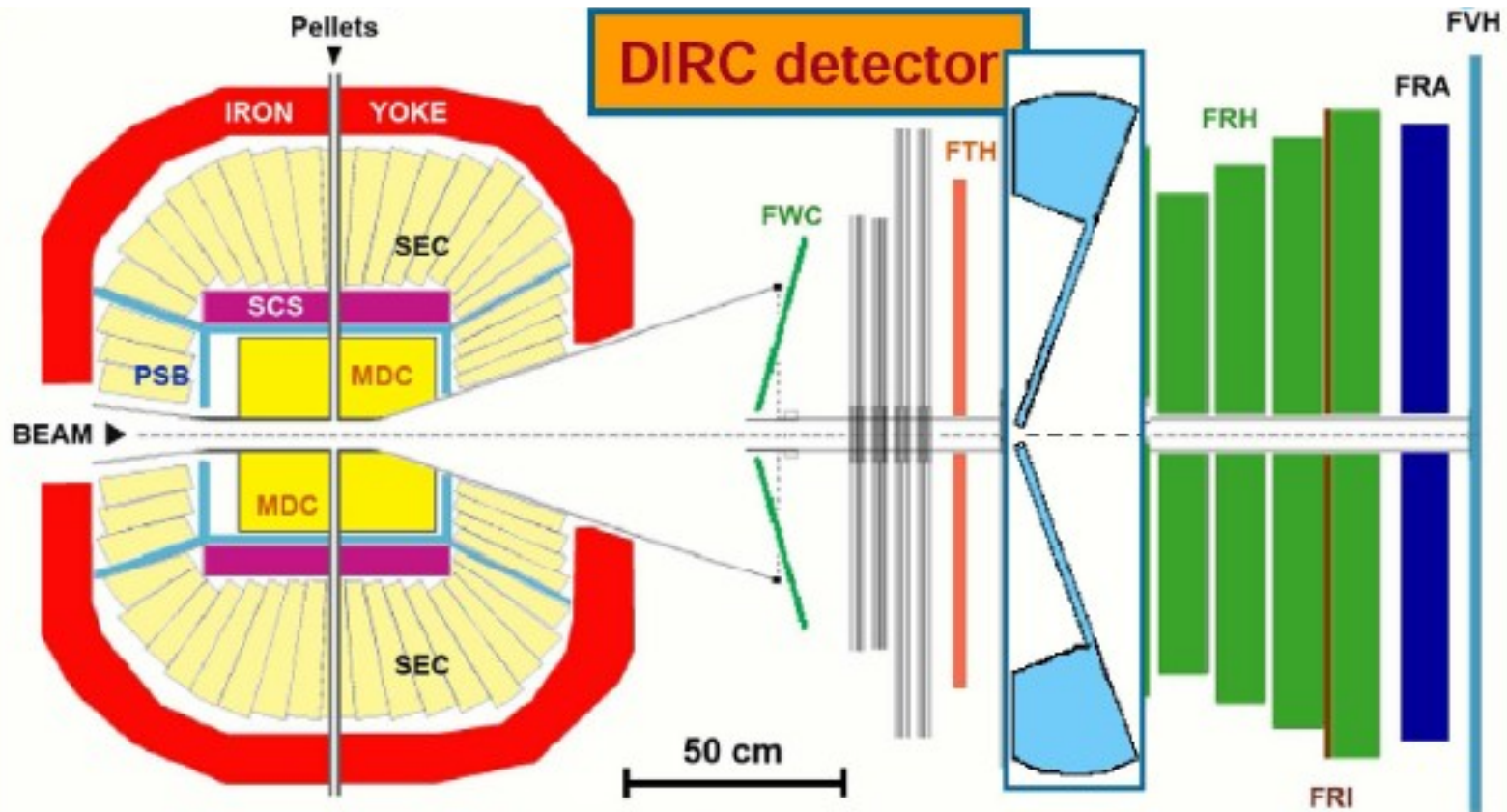
(bye bye )

Klaus Föhl
Universität Gießen

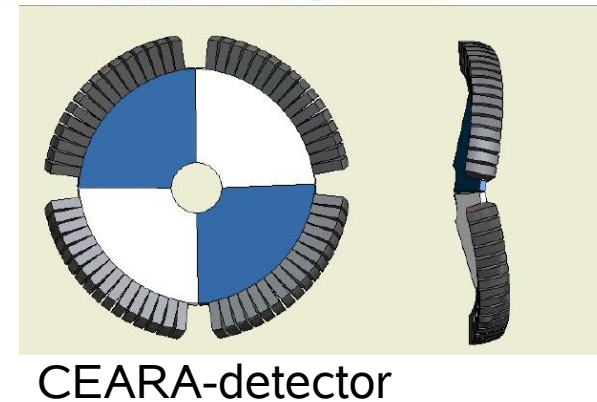
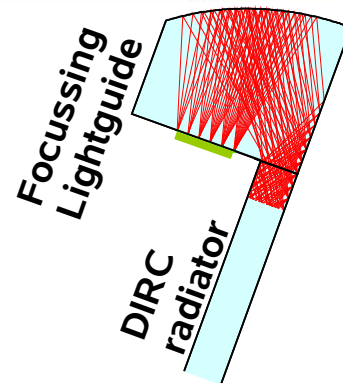
Panda workshop - PID Session CM XXVIII

GSI Darmstadt 2009-03-03

Concept status end of 2008



- 20 degrees tilt
- extra space for tilt

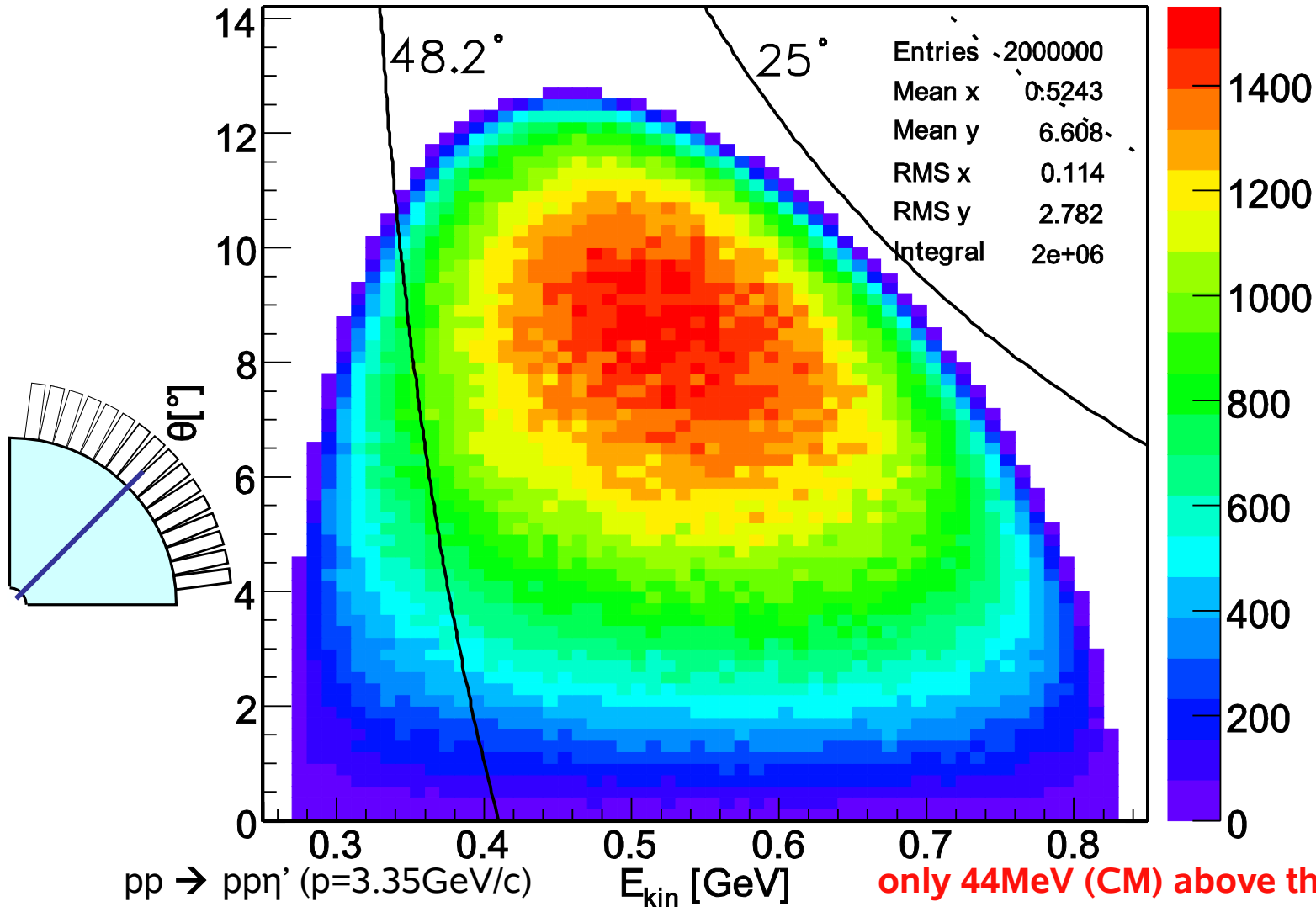


CEARA-detector

Phase Space & Detector Thresholds

plate tilted by 20 deg

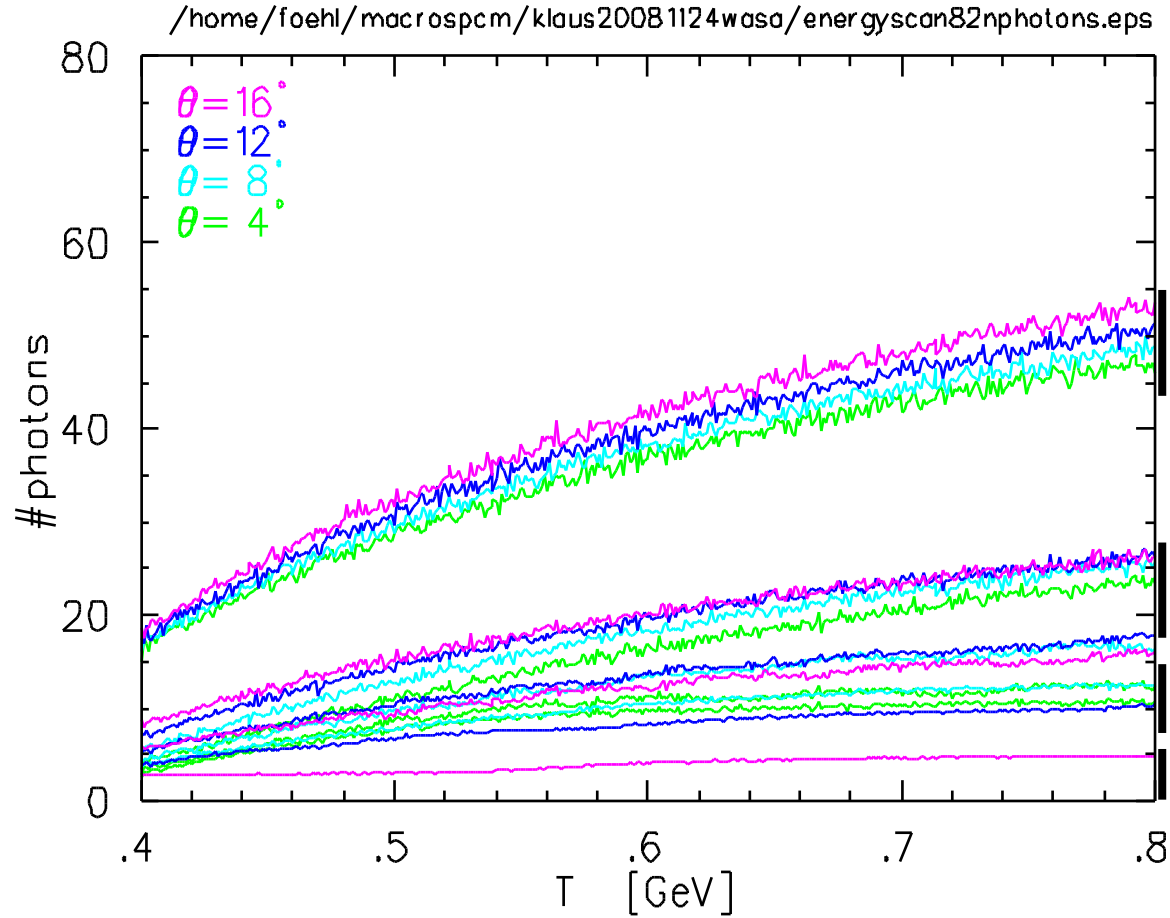
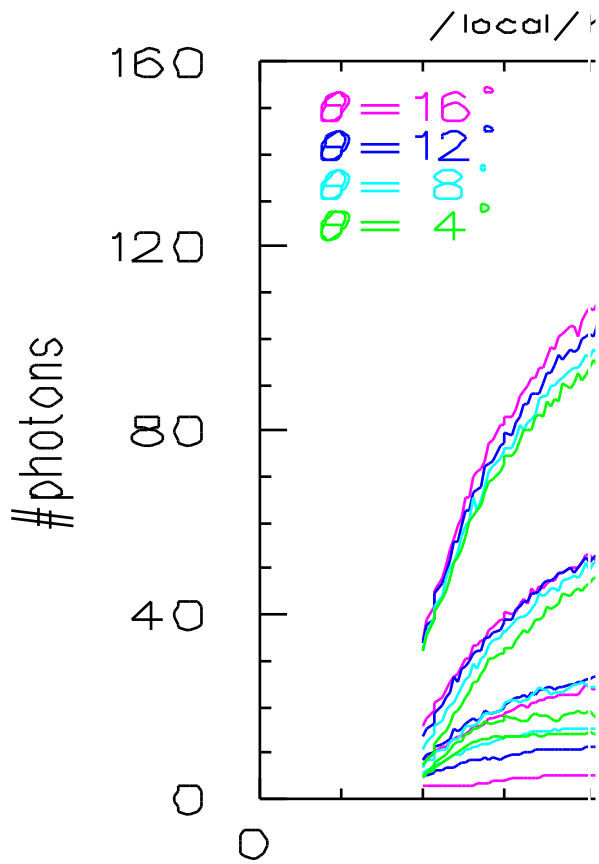
(T, θ) 20°



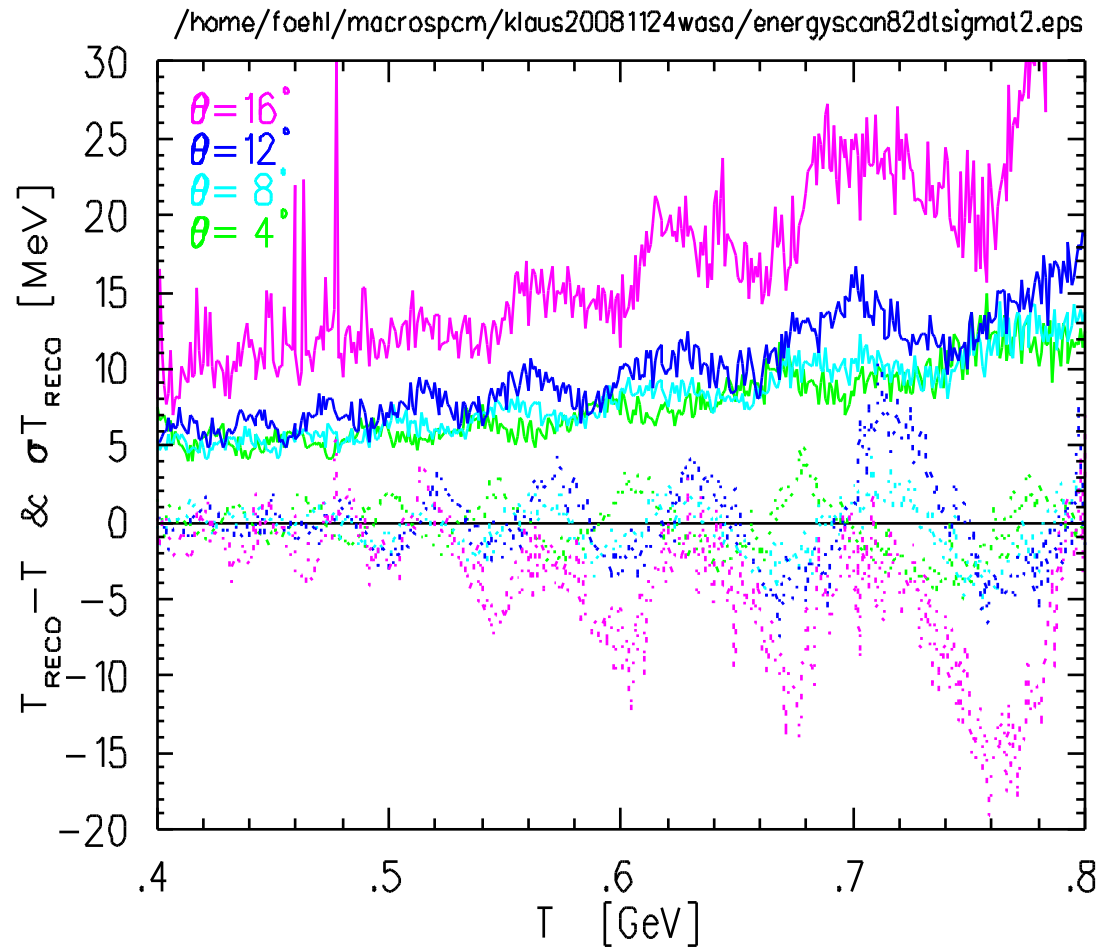
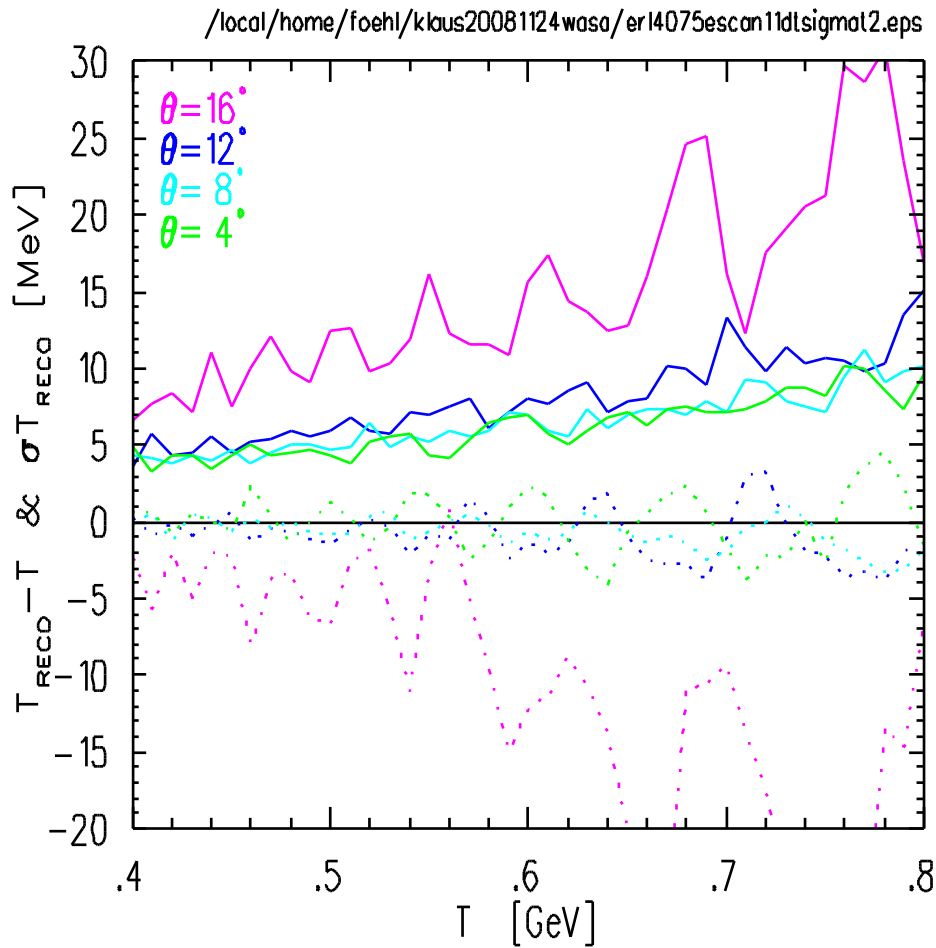
Boundary conditions and wishes

- thinner Cherenkov radiator plate
- limited space availability
 - slice of 130mm (or 260mm)
- design for $pp \rightarrow pp\eta'$ ($p=3.35\text{GeV}/c$)
 - limit to maximum kinematic angle
- reduce photon number
 - other than thinner radiator

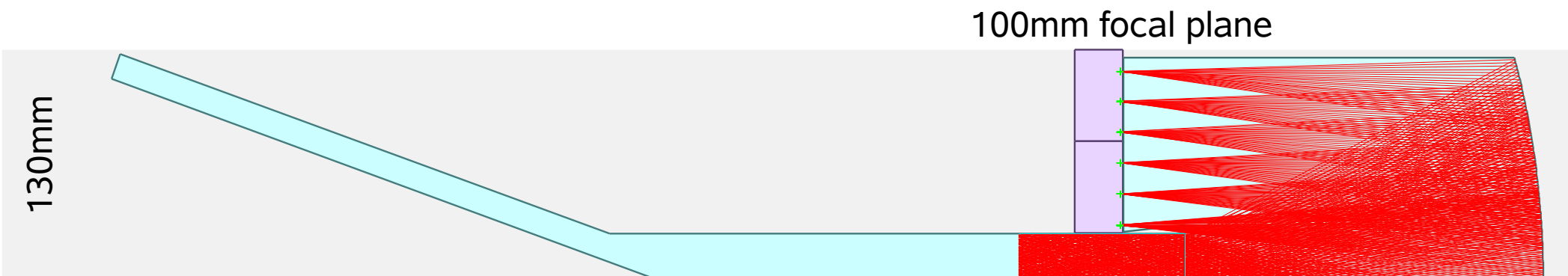
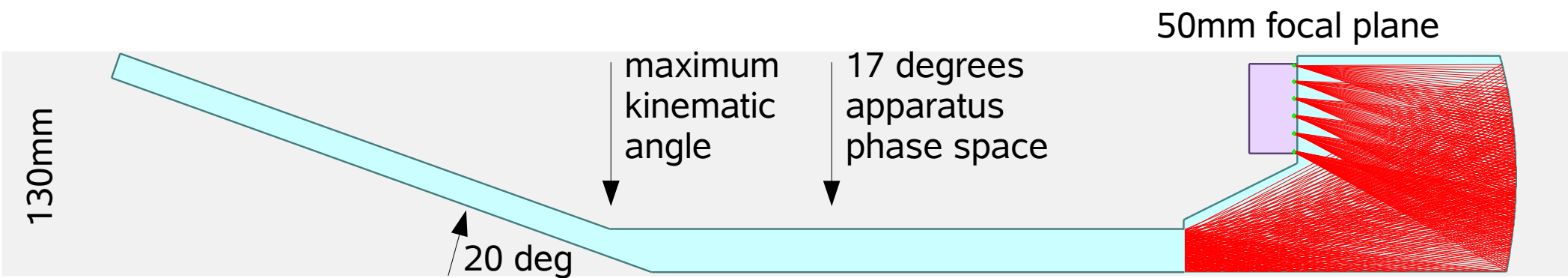
#Photons 30mm versus 15 mm



Detector performance 30mm vs 15mm



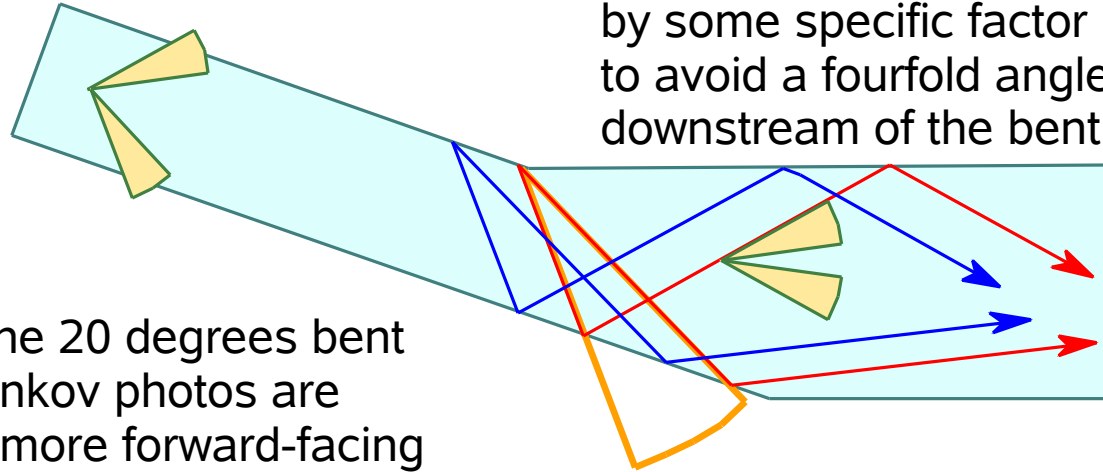
Light Guide designs inside 130mm



$2 \times 52\text{mm} + 25\text{mm} = 129\text{mm}$ is a very tight fit into the allotted 130mm width

Angle situation

the plate angle change requires that the plate thickness increases by some specific factor (here 1.6) to avoid a fourfold angle ambiguity downstream of the bent line.

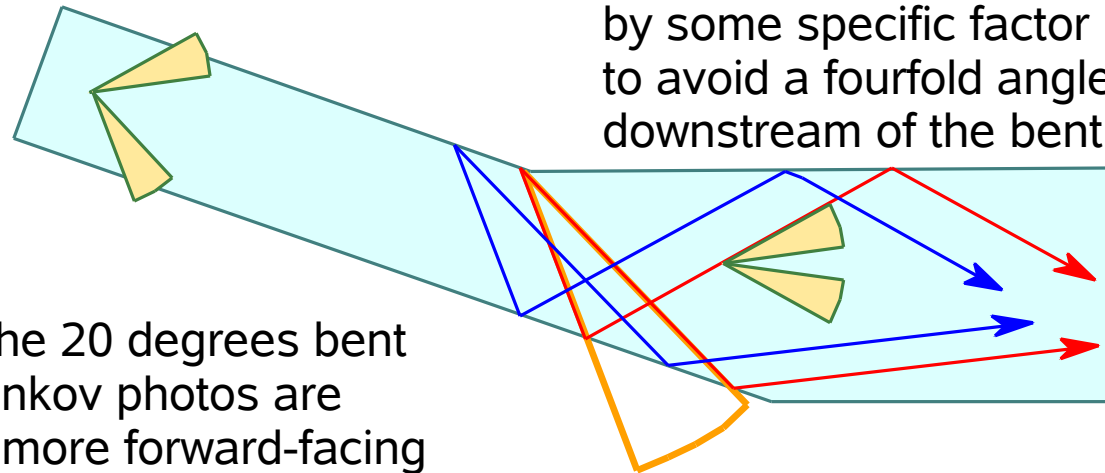


after the 20 degrees bent
Cherenkov photos are
much more forward-facing

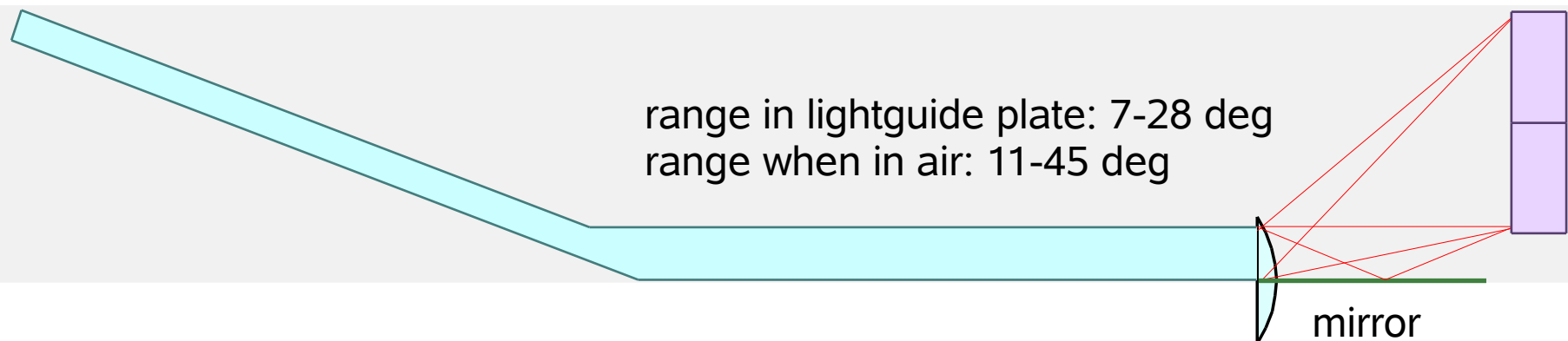
Possibility of lense imaging

the plate angle change requires that the plate thickness increases by some specific factor (here 1.6) to avoid a fourfold angle ambiguity downstream of the bent line.

after the 20 degrees bent Cherenkov photos are much more forward-facing

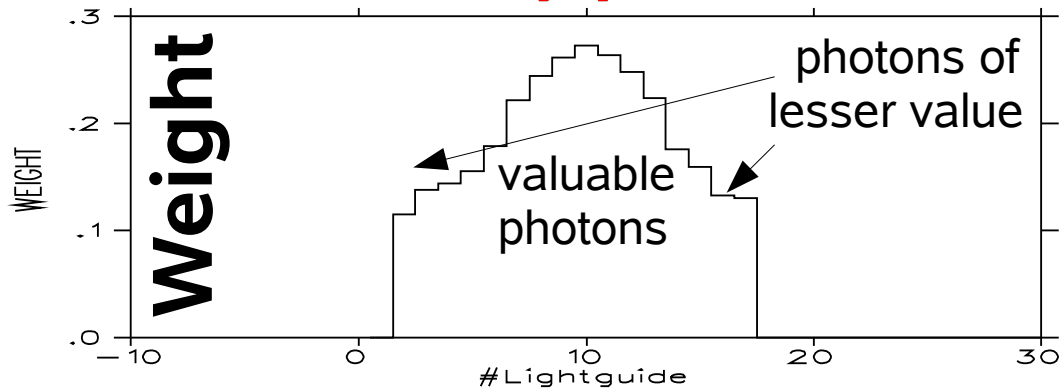
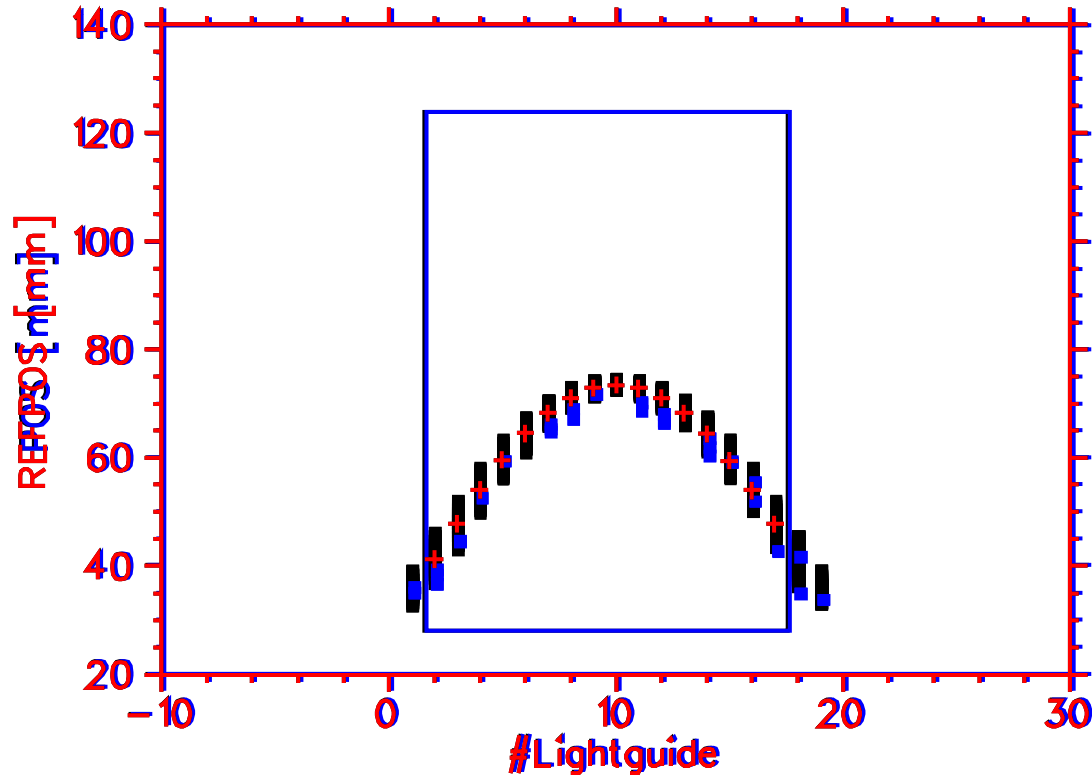


range in lightguide plate: 7-28 deg
range when in air: 11-45 deg



circumstances make use of a lense more suitable

Photon pattern analysis



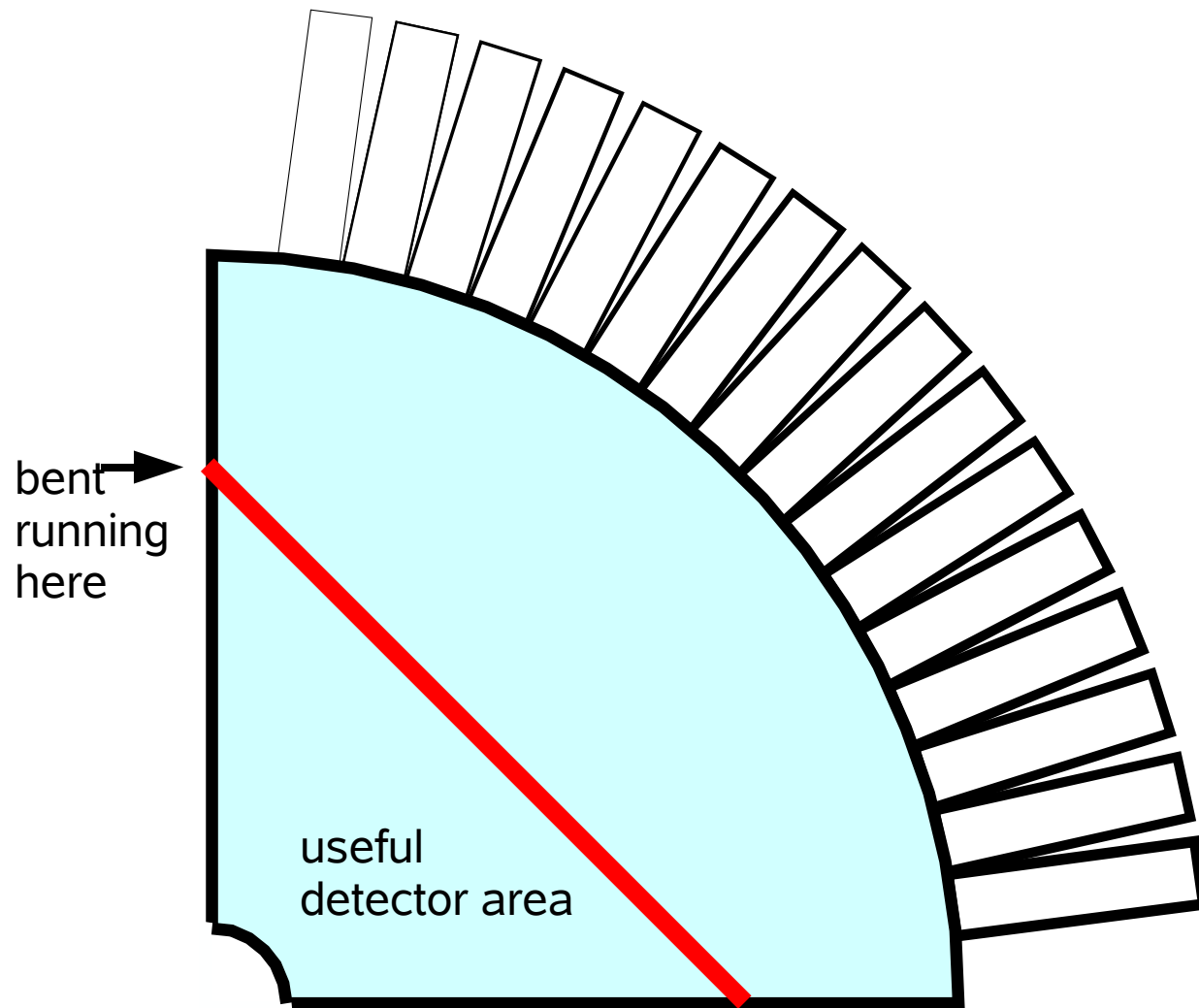
photons come with different levels of appreciation:

if photon rate is too high (i.e. for phototubes) then

1) make the photons more valuable (better phi resolution)

2) keep photons that for a given phi range smear less in theta

sketch



Increasing value per photon

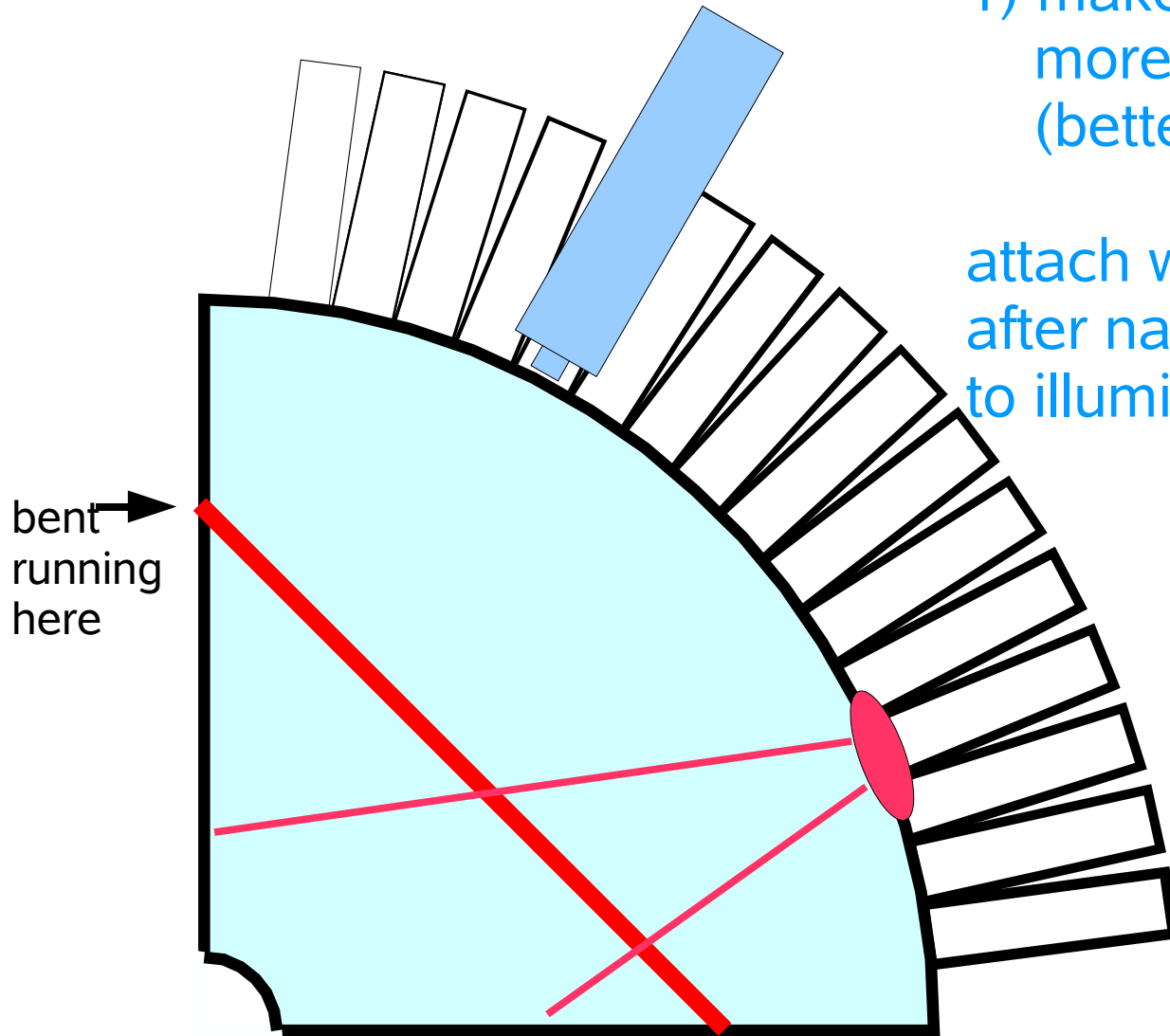
1) make the photons more valuable
(better phi resolution)

attach wider light guide
after narrow passage
to illuminate entire PMT

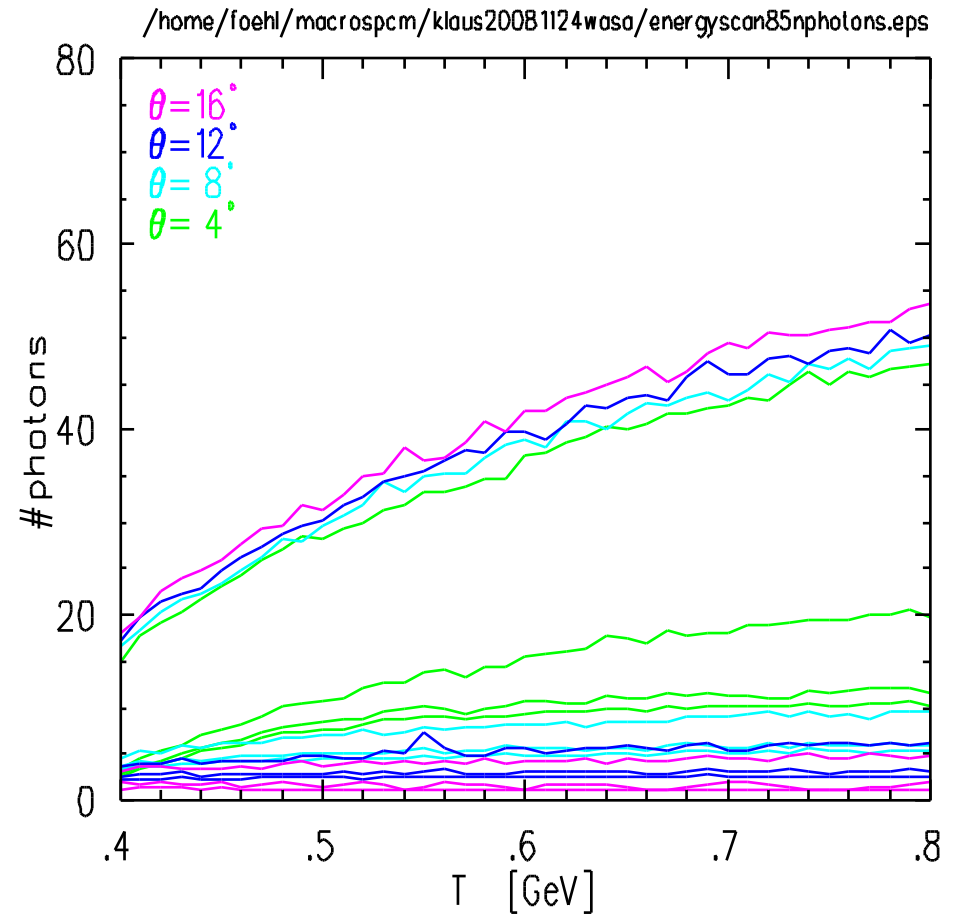
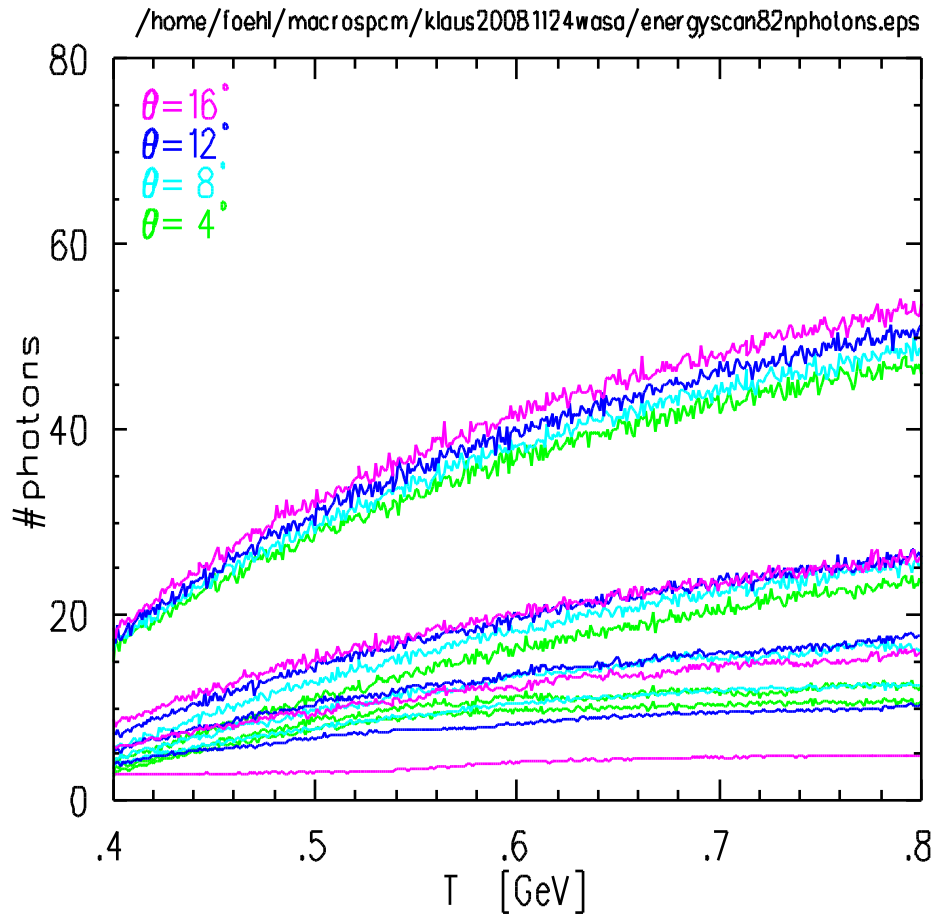
2) keep photons that for
a given phi range
smear less in theta

use image size of lense

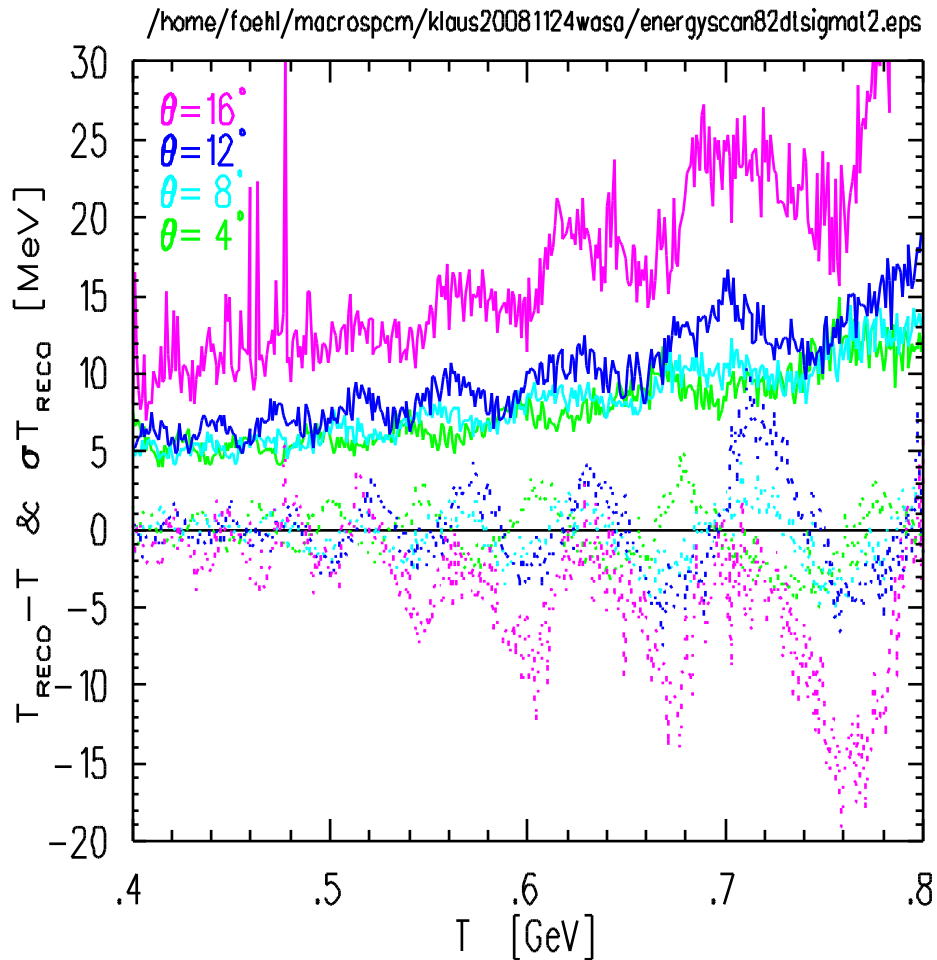
only photons from a
narrower angle range
arrive on the focal plane



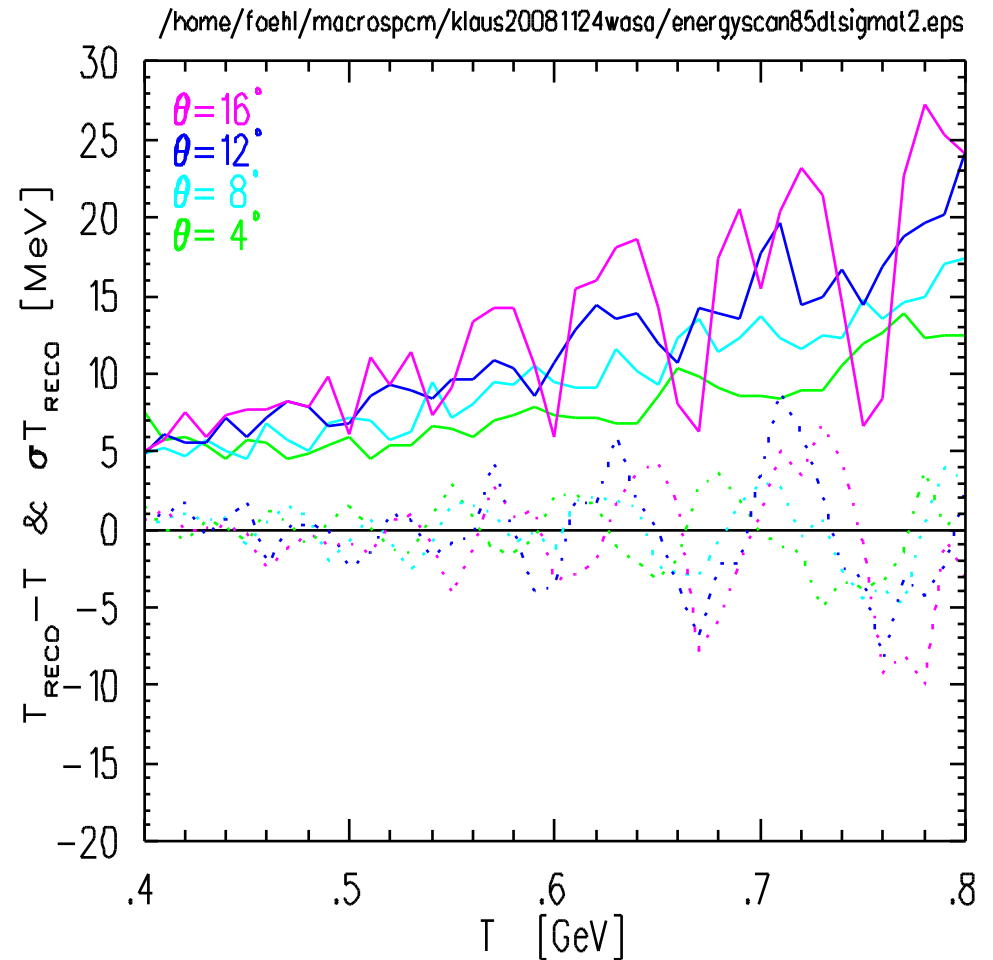
#photons with limited lateral angle



Limited lateral angle E-resolution



focussing lightguide angle acceptance



angle acceptance 50mm for f=100mm

Conclusions - *and a Question*

- Modified CEARA* detector shape can fit into the allotted 130mm slice width in the WASA set-up
- ➔ only smaller solid angle range instrumented
theta~12degrees
- Photon numbers can be reduced intelligently
hence the resolution decreases less than \sqrt{N}
- Lenses are better suited than light guides

Question: is a Lensing DIRC instead of Focussing Light Guides still a good enough prototype for DIRCs at PANDA?

* *Cherenkov-Emissions-Analysierender Ringscheiben-Apparat*

backup slides

some pros and cons

- focussing at COSY would not be of PANDA type
-
- Scottish prototype is featuring FLGs
- photon pattern independent of imaging element
- DIRC plate principle would be tested anyway
-
- political question – how close has a prototype to come to the main detector ?

/home/foehl/macrospcm/klaus20081124wasa/energyscan82nphotons.eps

