

Update on the Giessen activities

Klaus Föhl *on behalf of the Gießen group*
Panda Collaboration Meeting - Cherenkov
Torino 16 June 2009



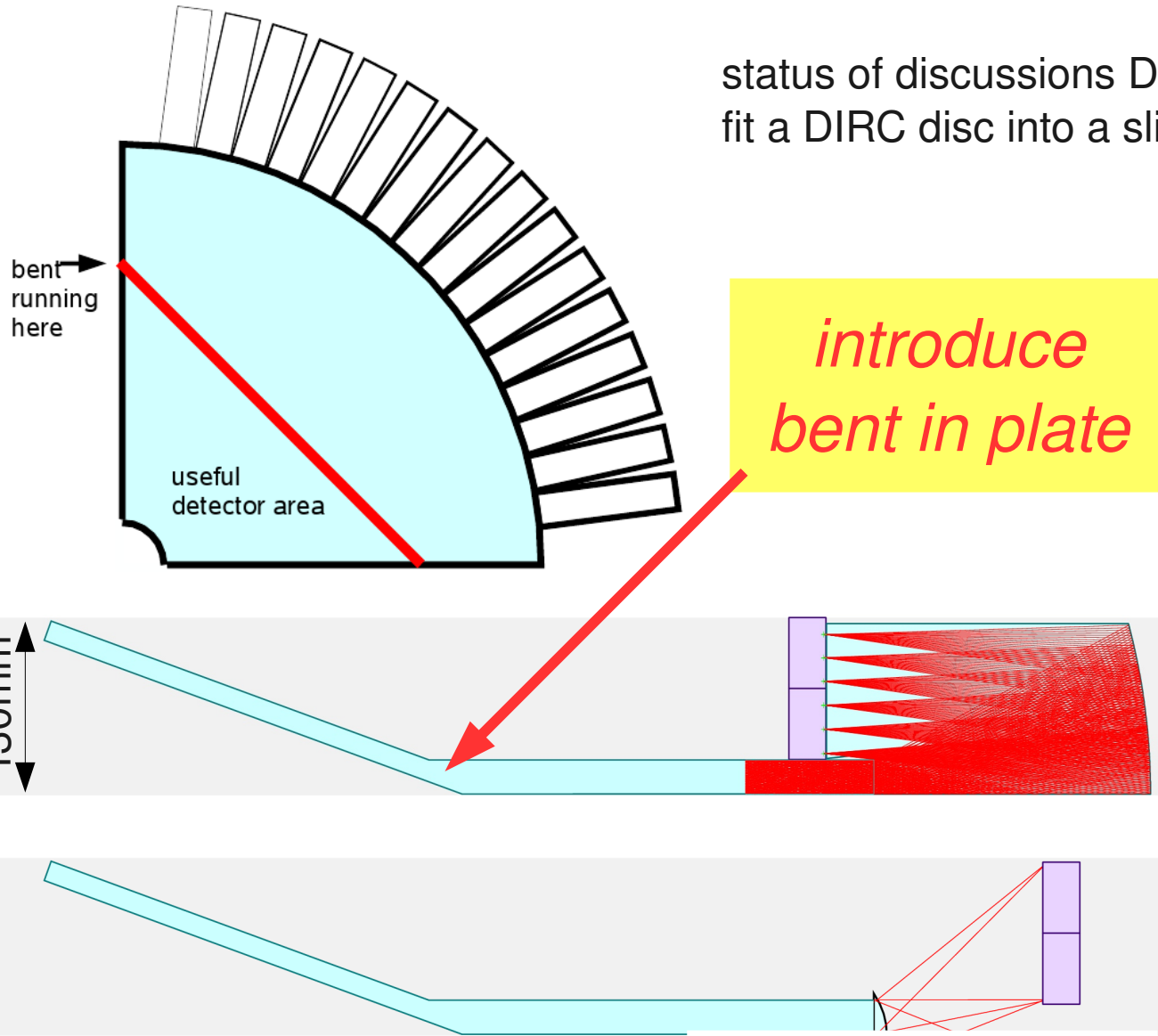
Outline

- *update since Gießen&Rauischholzhausen workshop*
- DIRC@WASA
 - VM2000 superreflecting foil
- Geiger-APD activities
- 3D DIRC
 - hybrid design concept
 - investigation in progress



WASA DIRC – into 130mm width

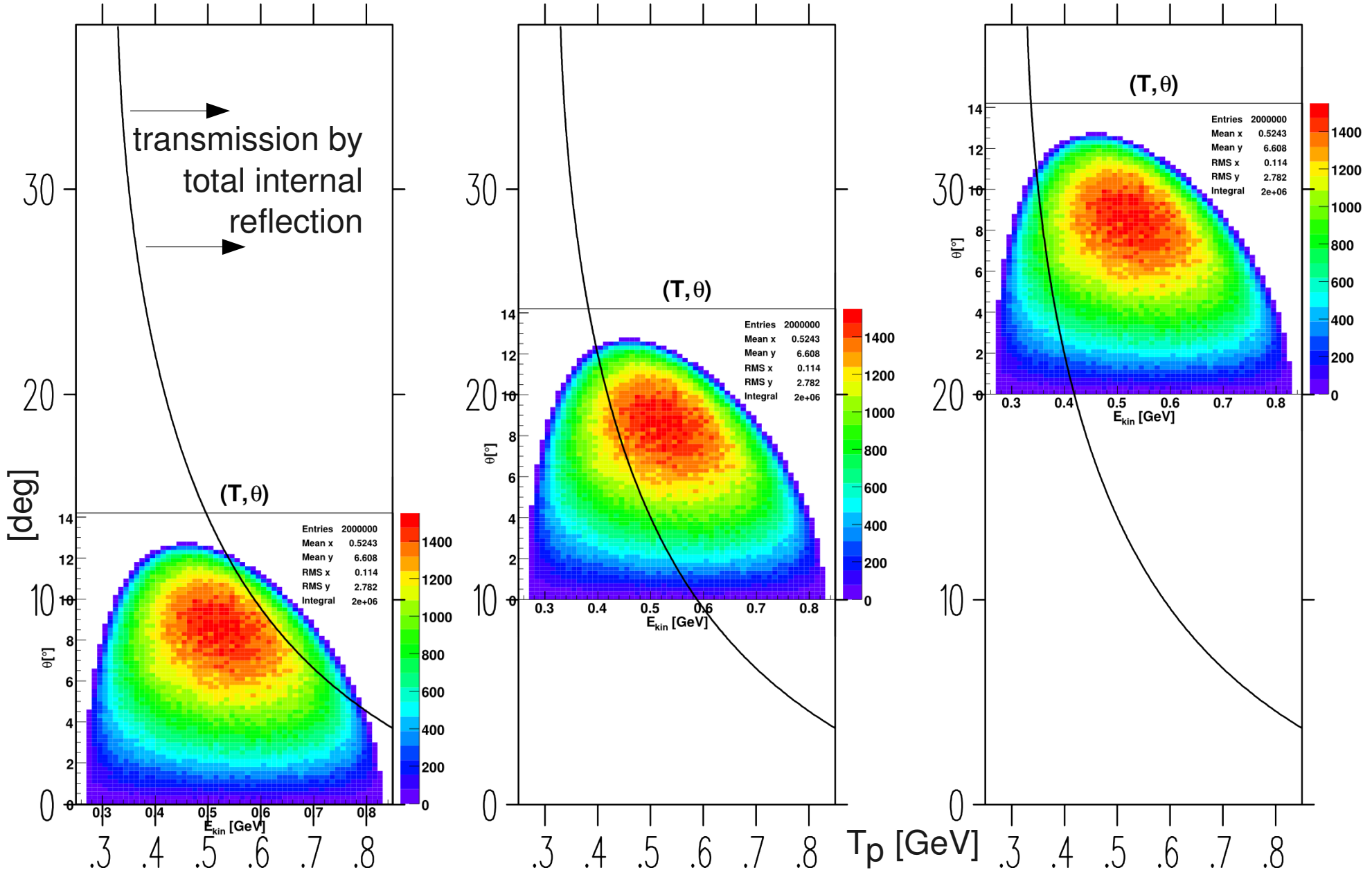
status of discussions December 2008:
fit a DIRC disc into a slice 130mm thick



Klaus Föhl



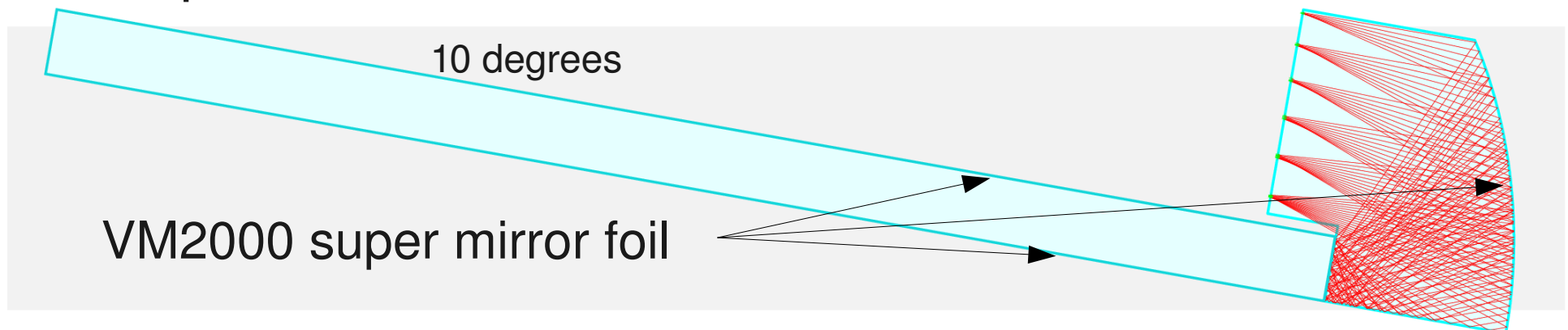
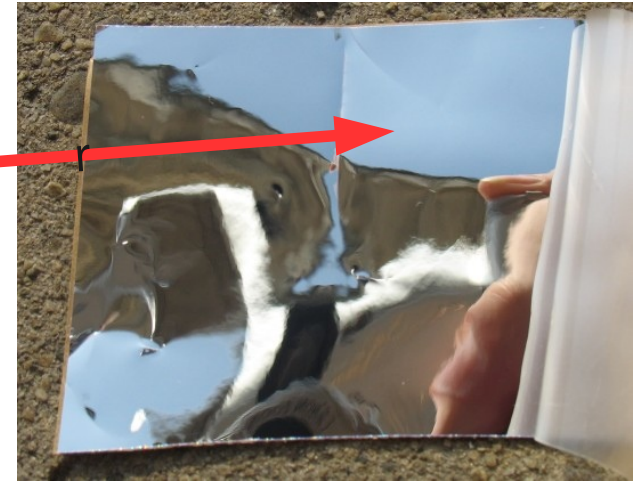
Inclination-dependent limits





(Very) Recent discussions

- Persisting interest in pions
- VM2000 super mirror foil
- 98.5% reflectivity
 - quoted “somewhere”

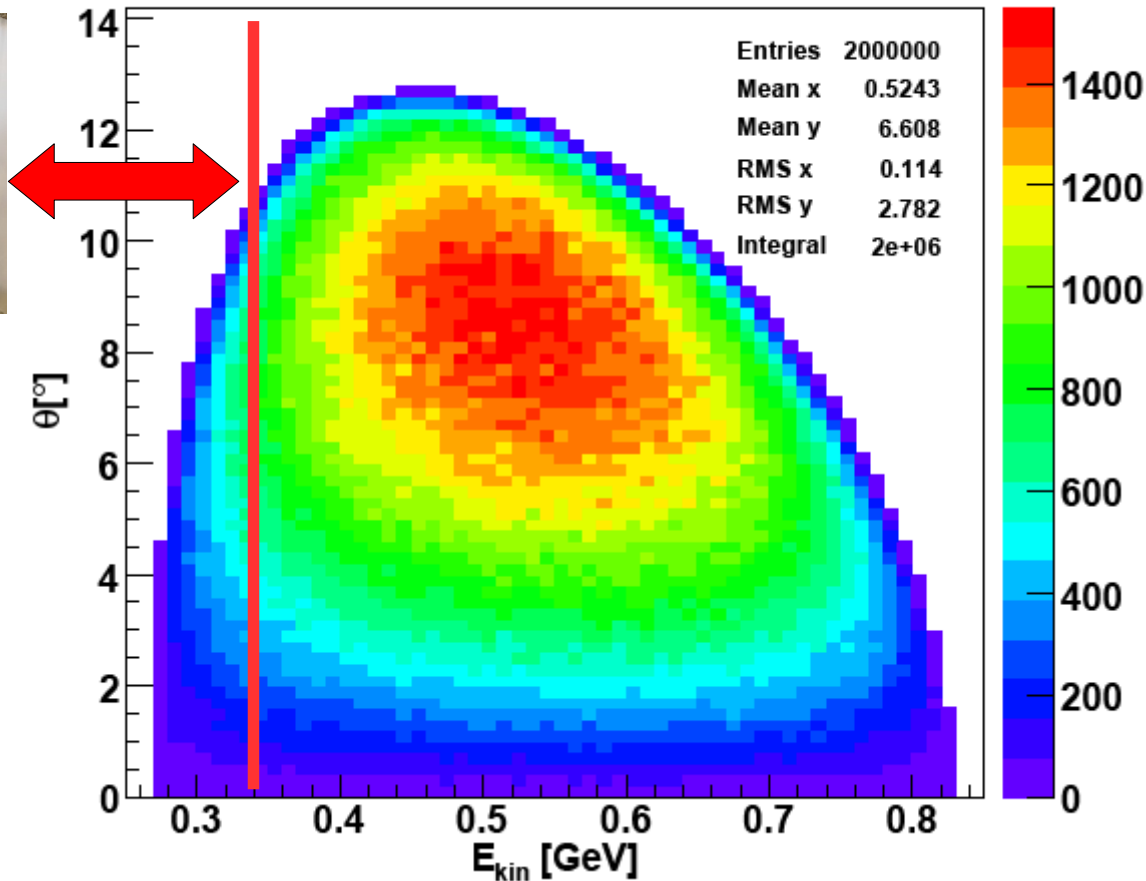


- tests still need to be performed
- *simulations done assuming this 98.5% value*



Eta': $pp \rightarrow pp\eta'$ ($p=3.35\text{GeV}/c$)

phase space plot (T, θ) courtesy Erlangen



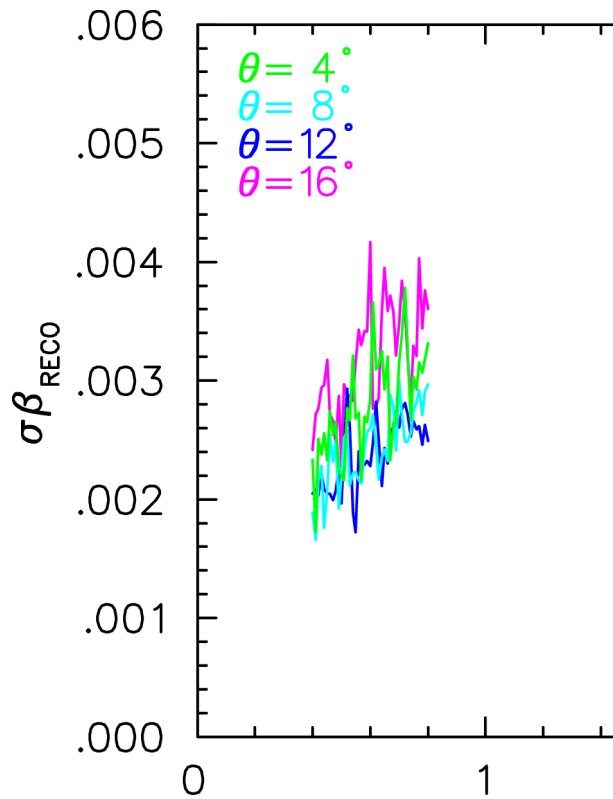
entire range is punch-through energies

hard threshold now is Cherenkov light threshold

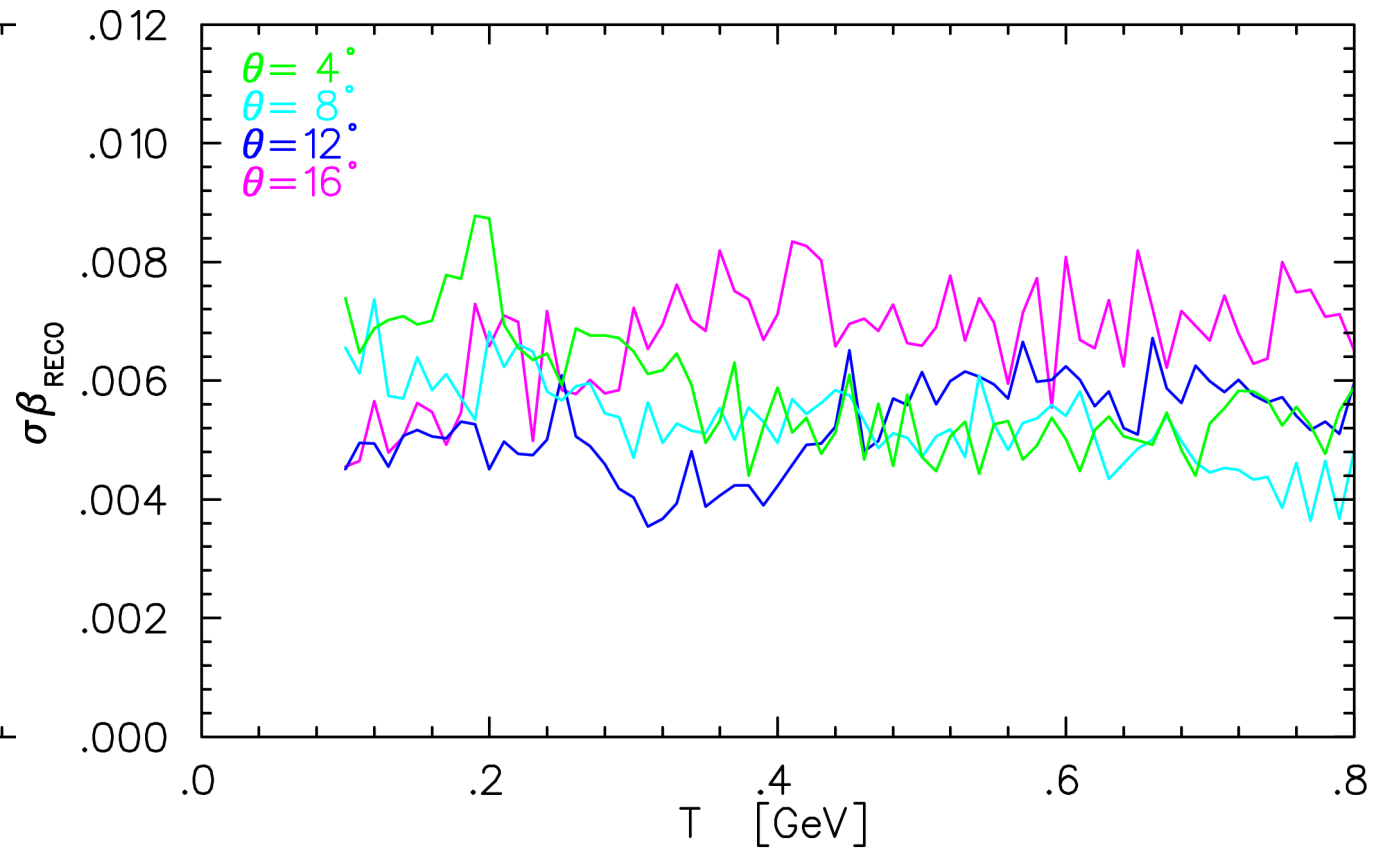


β Resolutions

protons, VM2000 foil



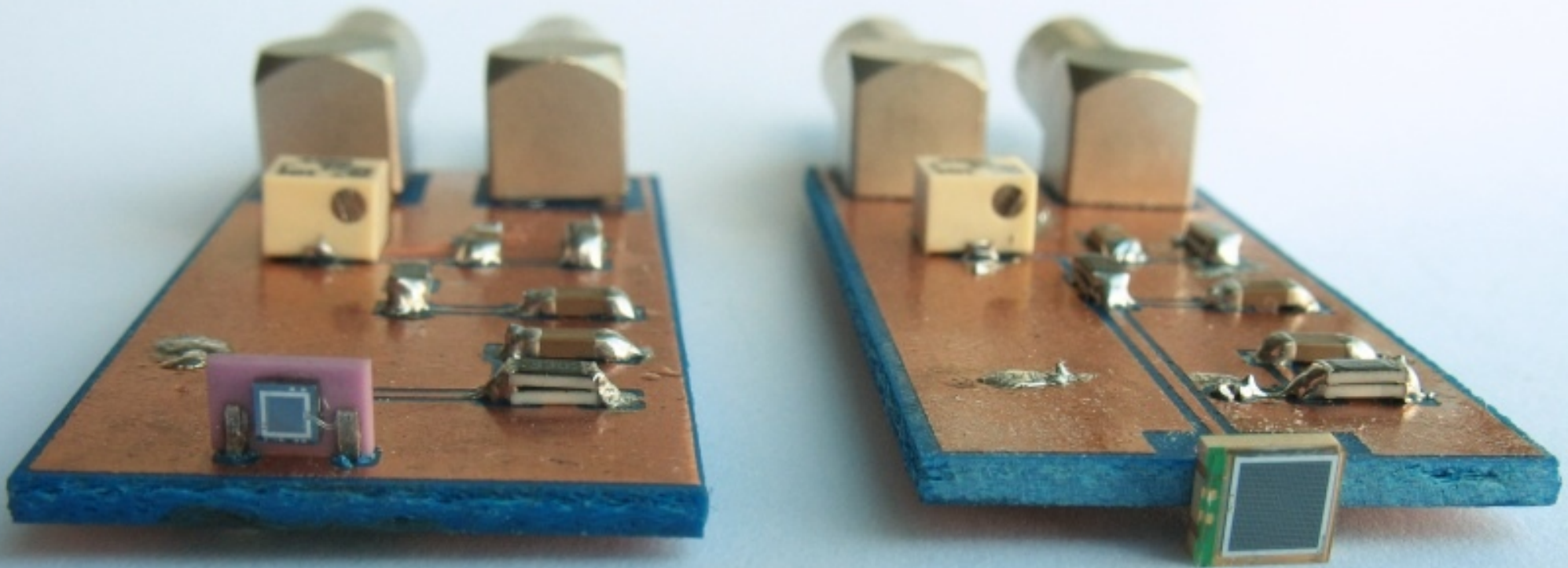
pions, VM2000 foil



Attention! Factor 2 difference in vertical scale.

tracking resolution 0.2deg

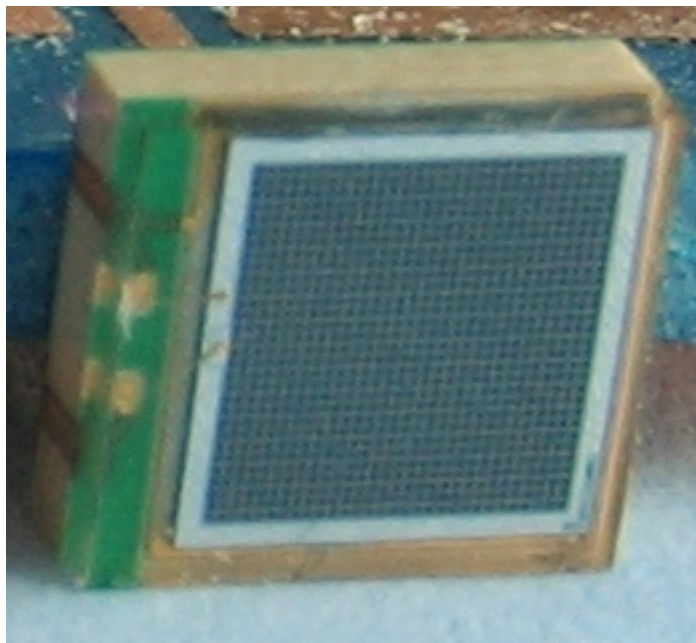
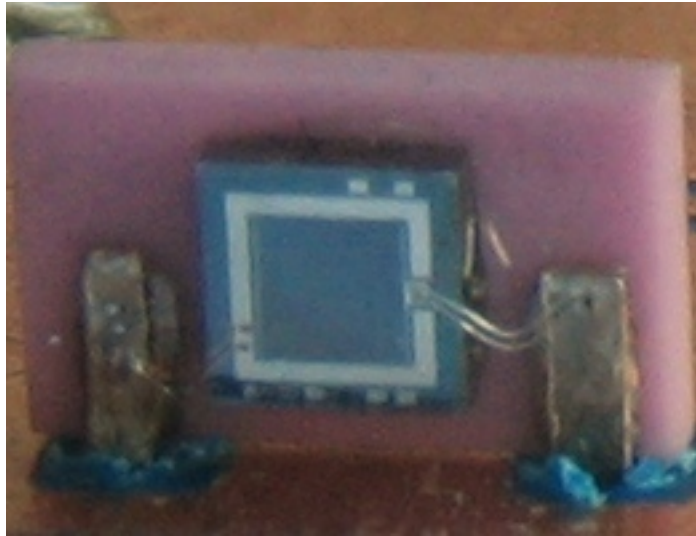
G-APD electronics boards



Benno Kröck, Avetik Hayrapetyan



G-APD test 1

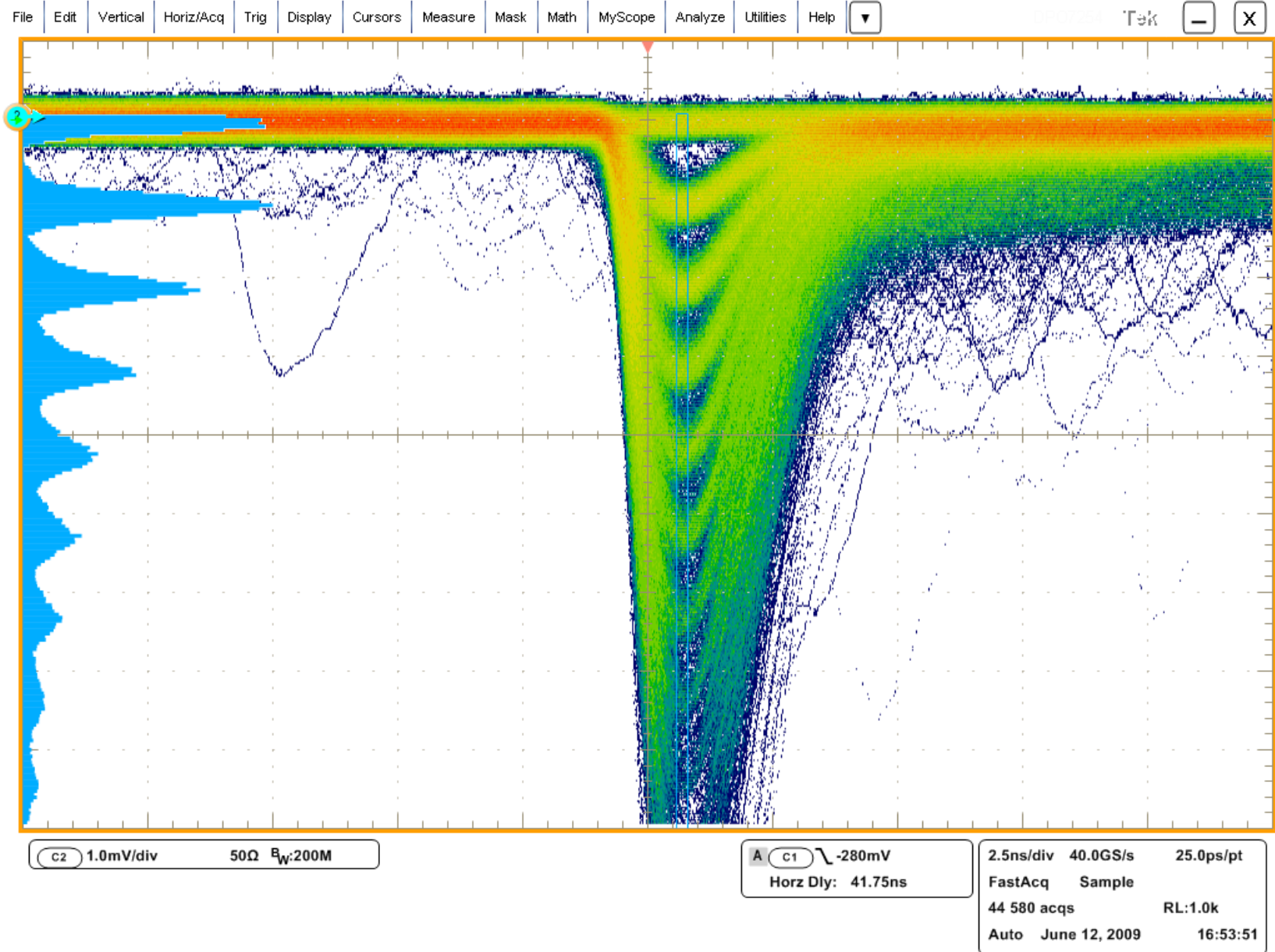


- 1mmx1mm and 3mmx3mm
- laser pulser feeding into light fibre
- improved electronics board





G-APD test 2

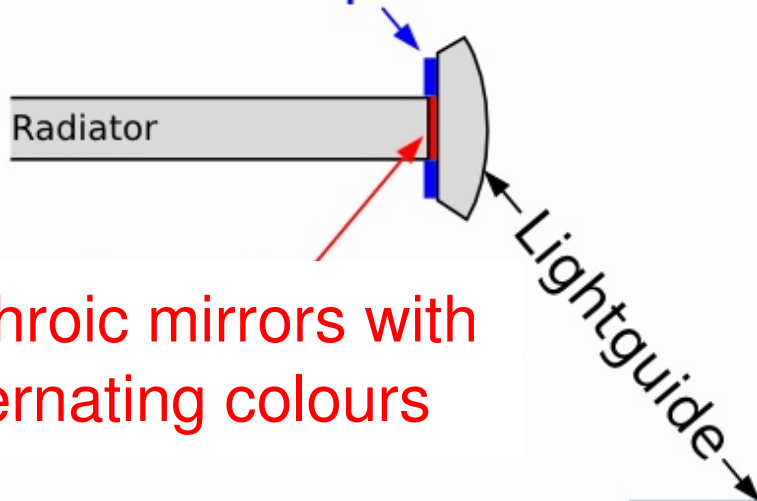


pixelized fast photodetector

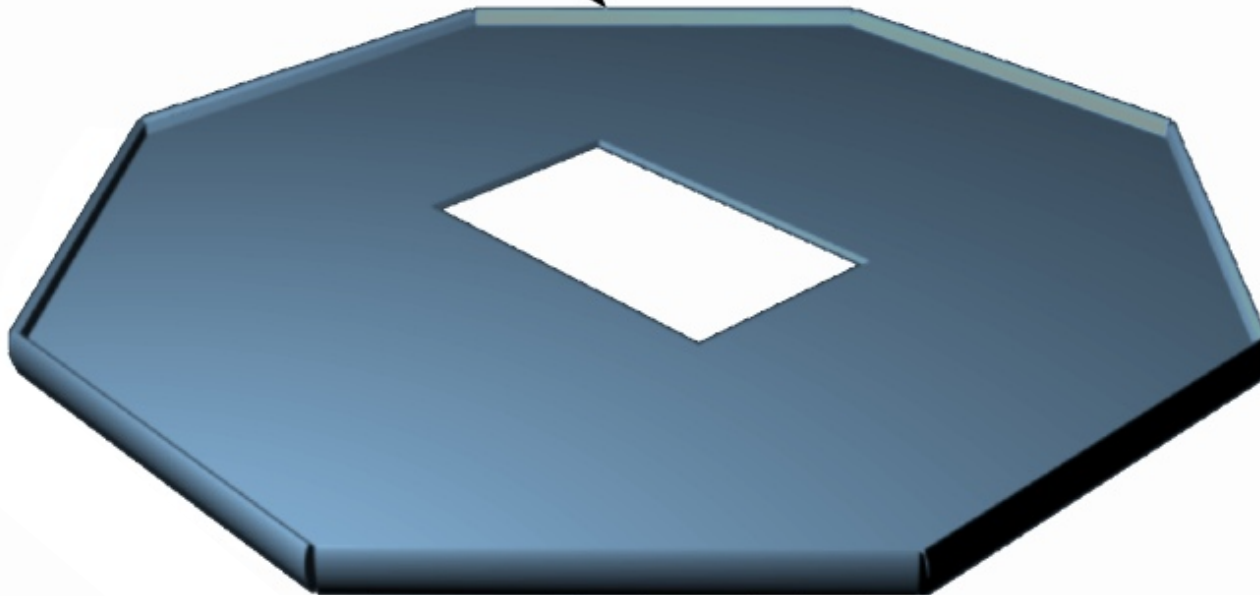


3D DIRC?

idea: Oliver Merle

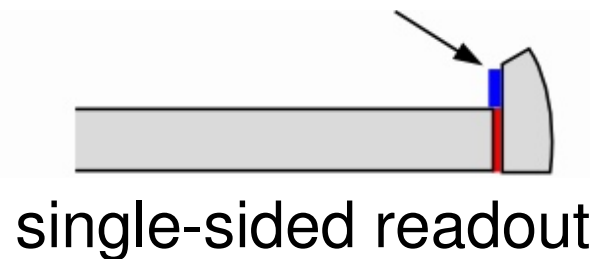


dichroic mirrors with alternating colours



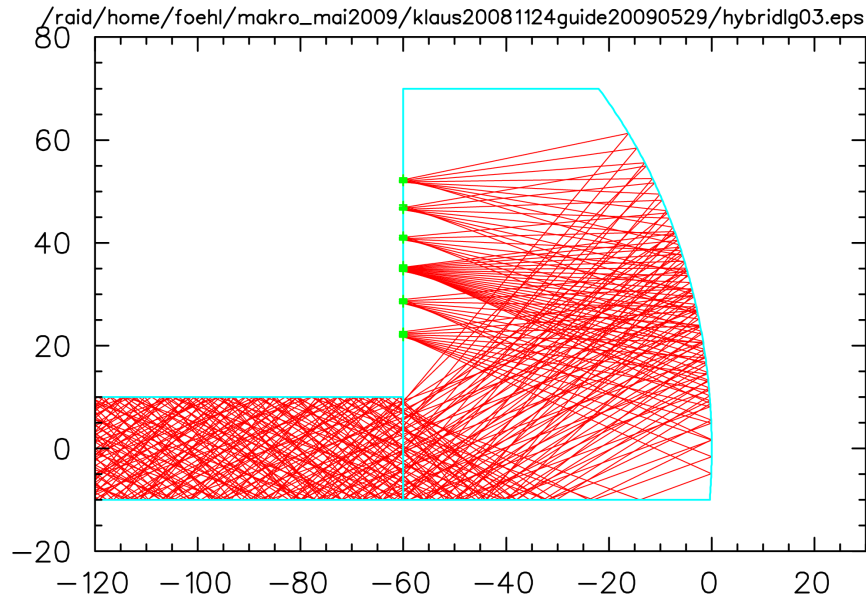
*Oliver Merle,
Peter Koch,
Klaus Föhl,
Michael Düren*

incline to suit B field?



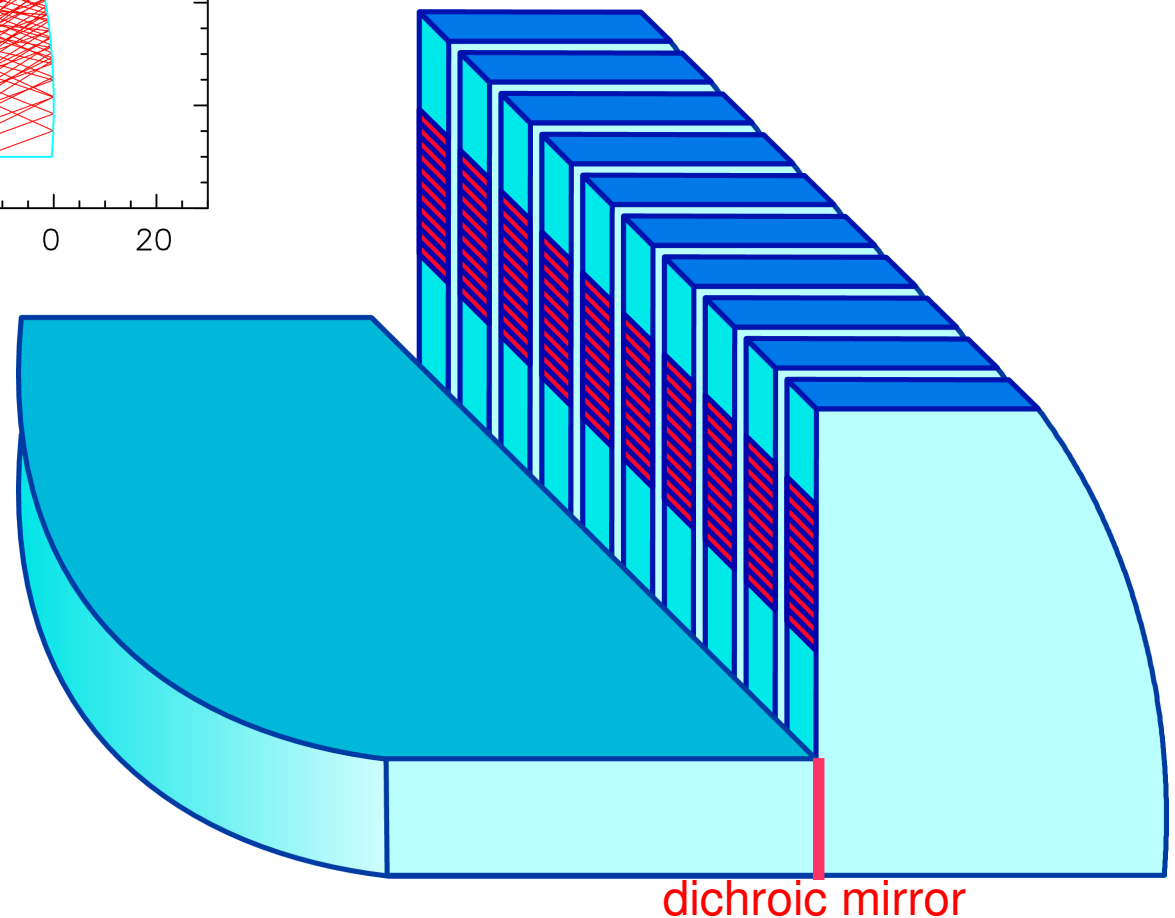


3D design for simulation



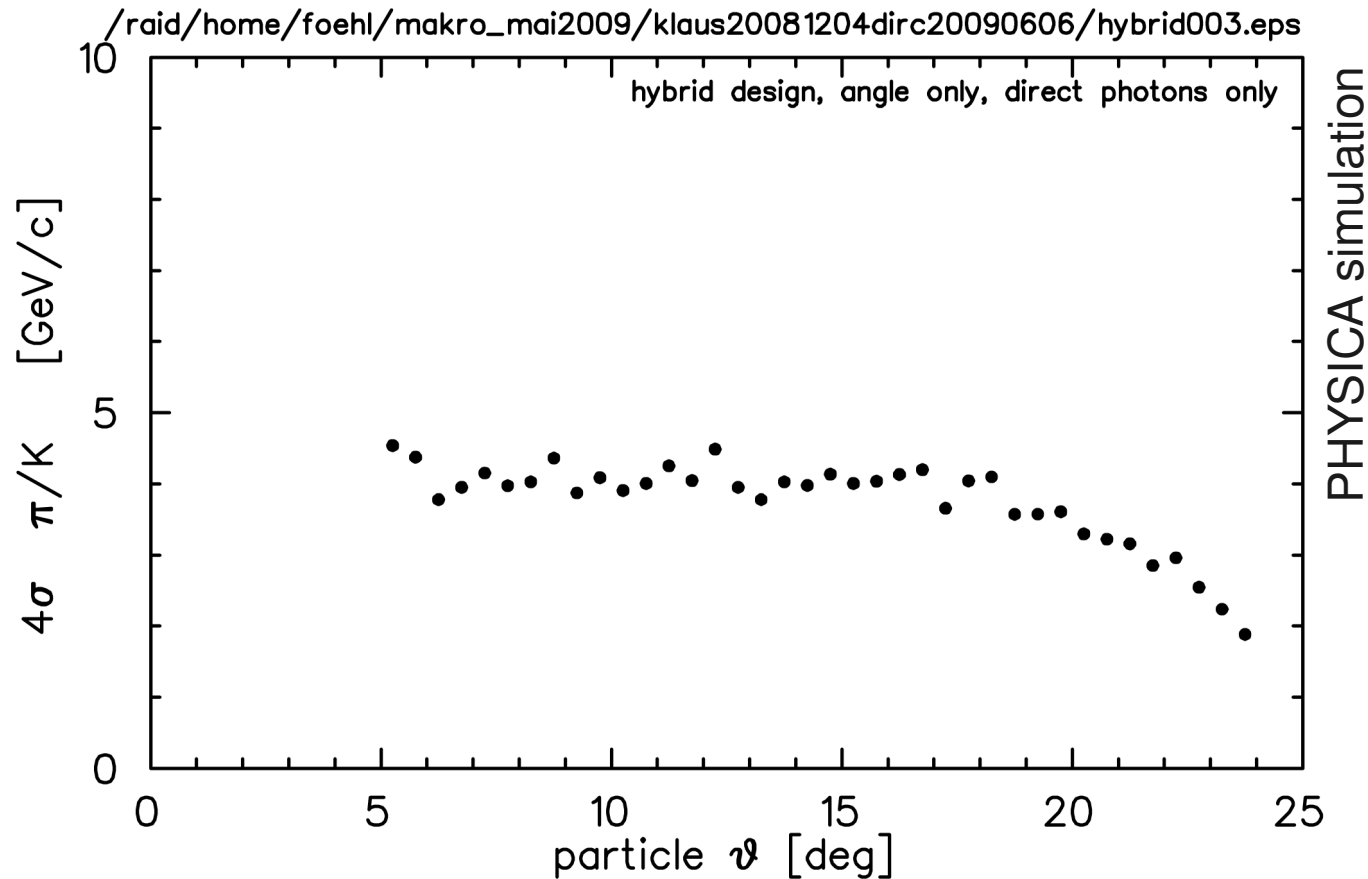
focussing lightguide
single sided readout
mirror coating required
light guides 10mm wide

reference implementation:
octagonal disc “r”=960mm
alternating dichroic mirrors
G-APDs in focal plane
32mm coverage, 1mm pitch
 $\sigma=40\text{ps}$ time resolution





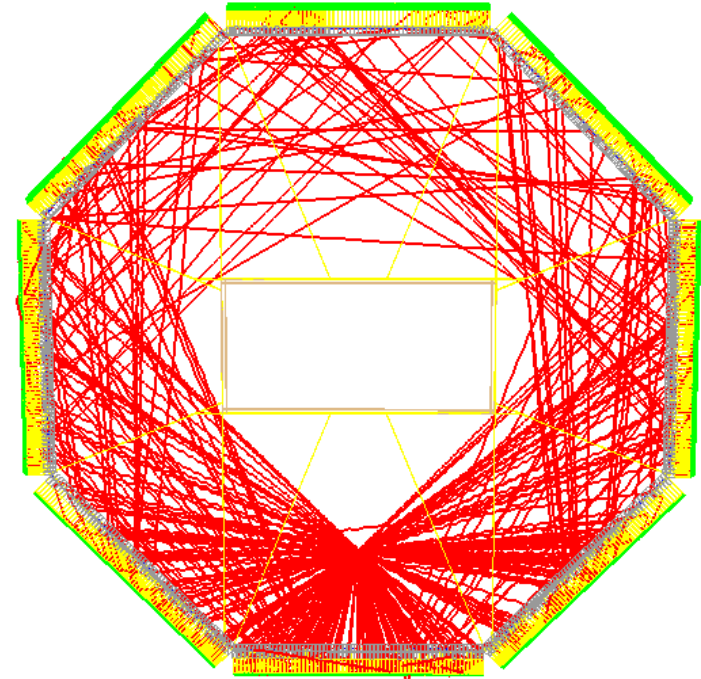
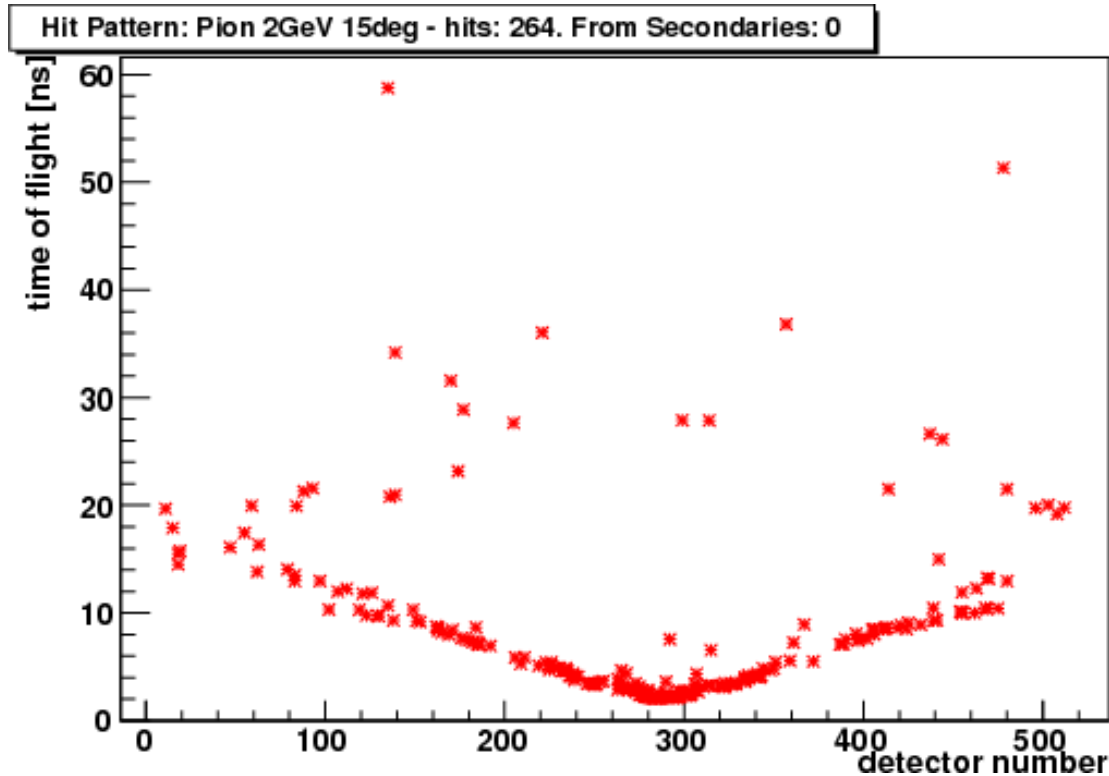
3D - FLG aspect only



- $\lambda=480\text{nm}-600\text{nm}$, PDE=0.2
- only direct photons



3D DIRC simulations



- full analysis currently being prepared
- hybrid design combining FLG and ToP methods
- investigating performance contributions

Thank you for your attention



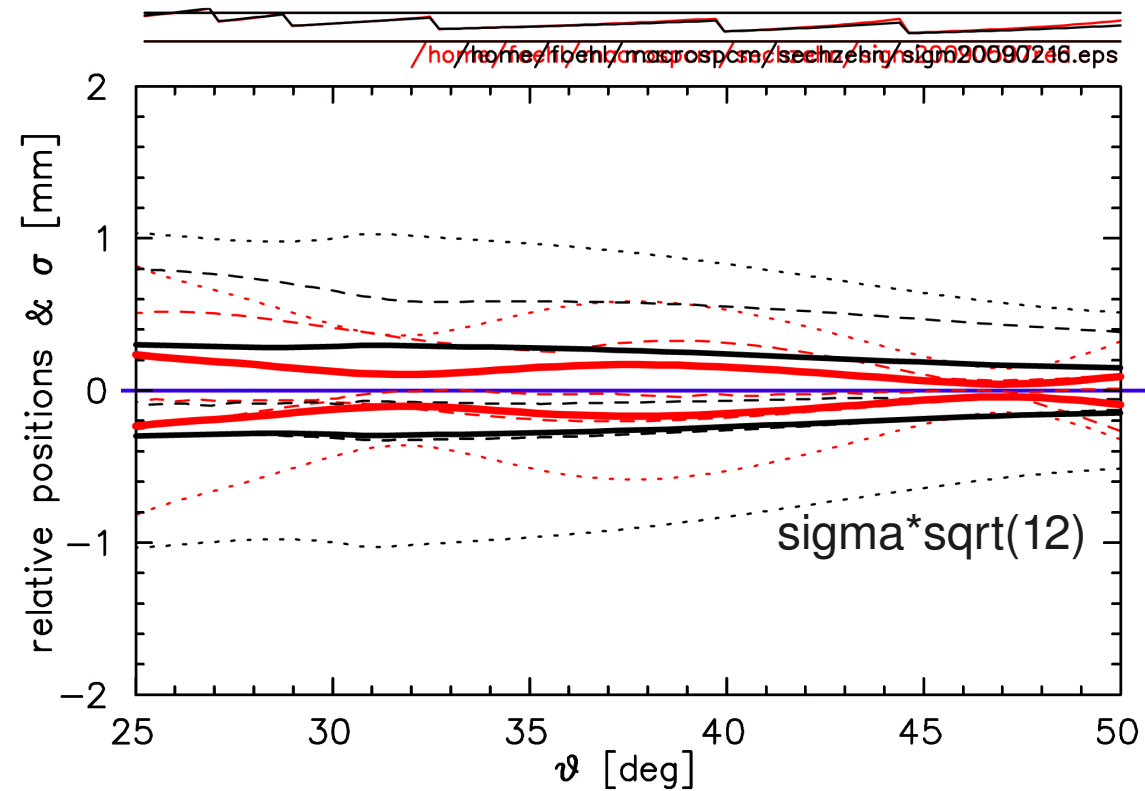
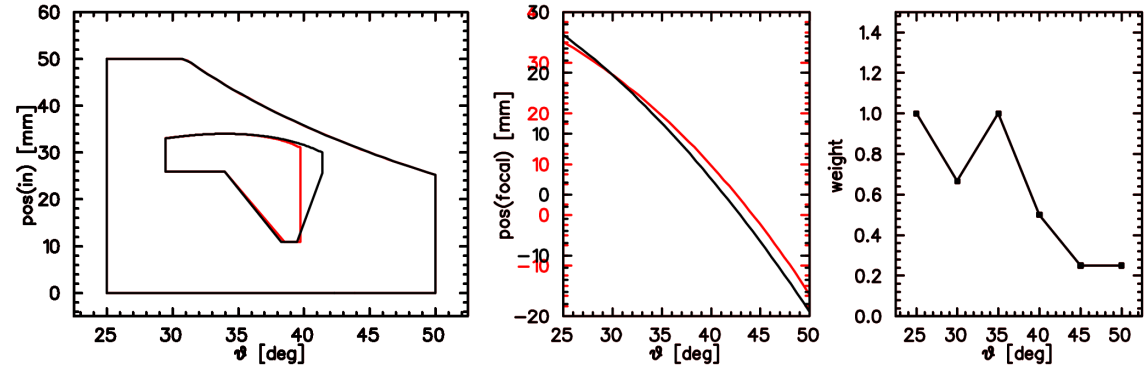
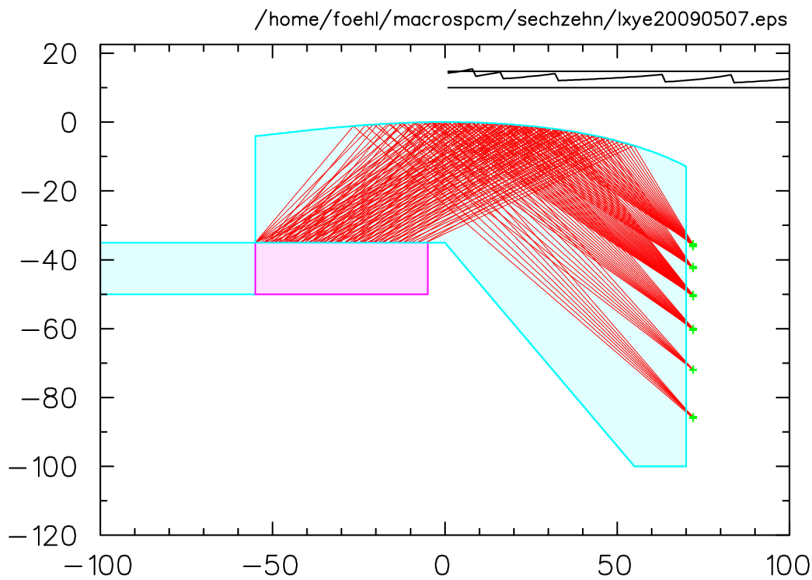
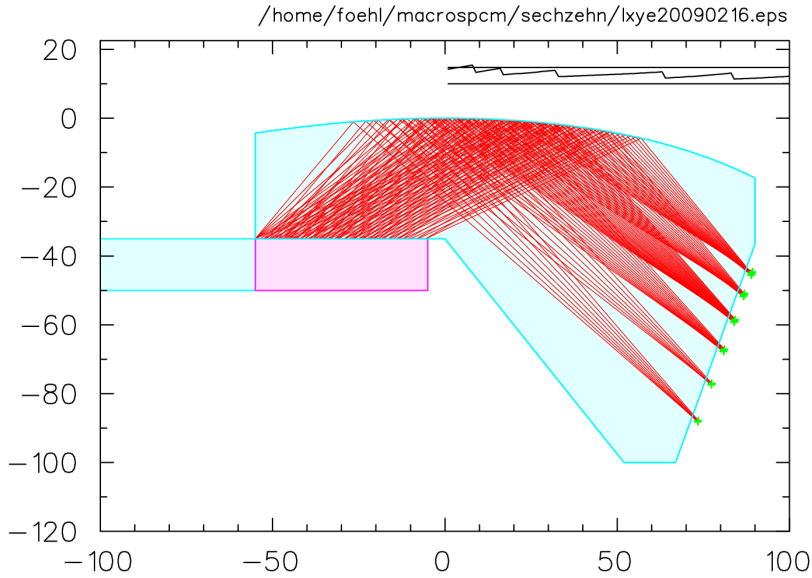
backup slides

some Rauischholzhausen



- Focussing Light Guide sheet and exchange data
- Qualitative&quantitative Light Guide assessment
- Dispersion correction considerations
- DIRC at WASA – CEARA detector aspects

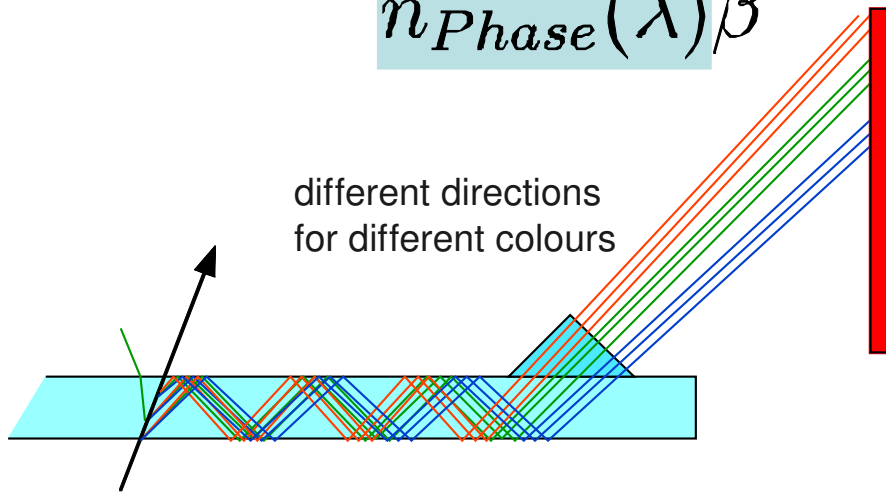
Focussing Light Guides - Comparison



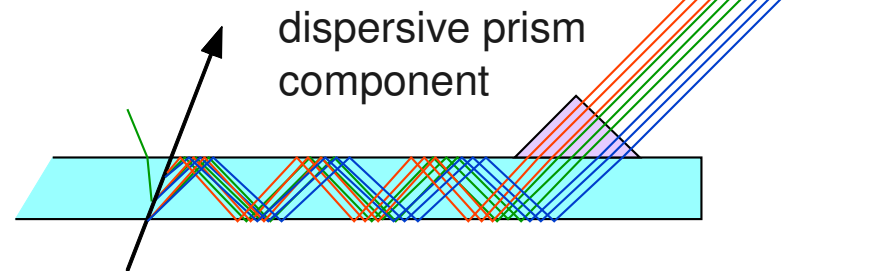
similar improvement for thinner quartz+LiF plate

Cherenkov Radiation Dispersion

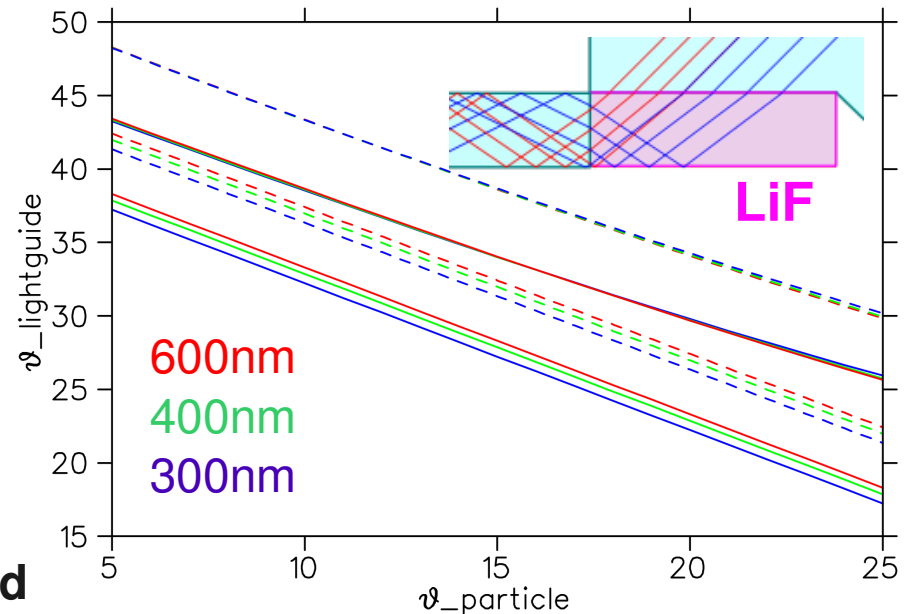
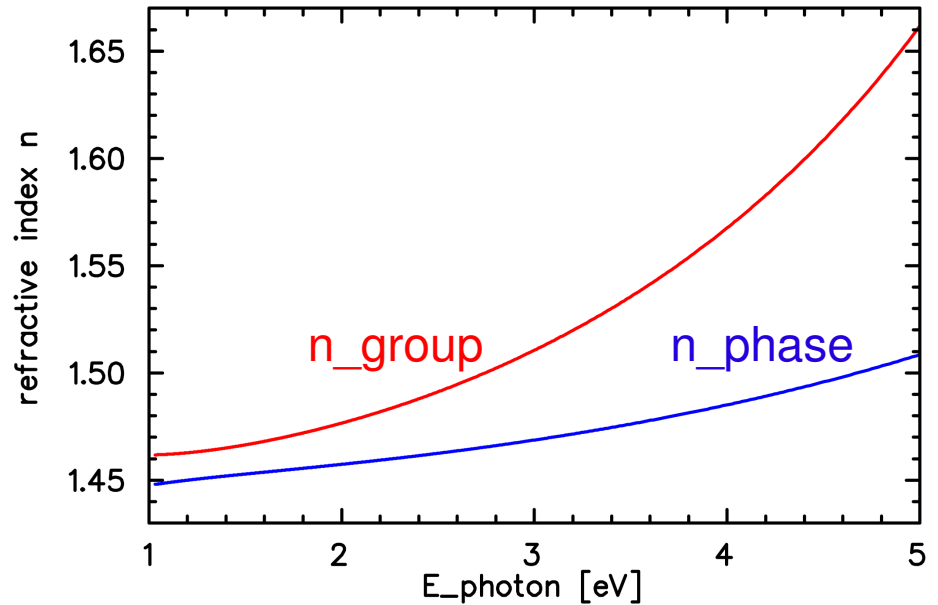
$$\cos \vartheta_C = \frac{1}{n_{Phase}(\lambda)\beta}$$



Dispersion correction principle:
material with similar n
but different $dn/d\lambda$

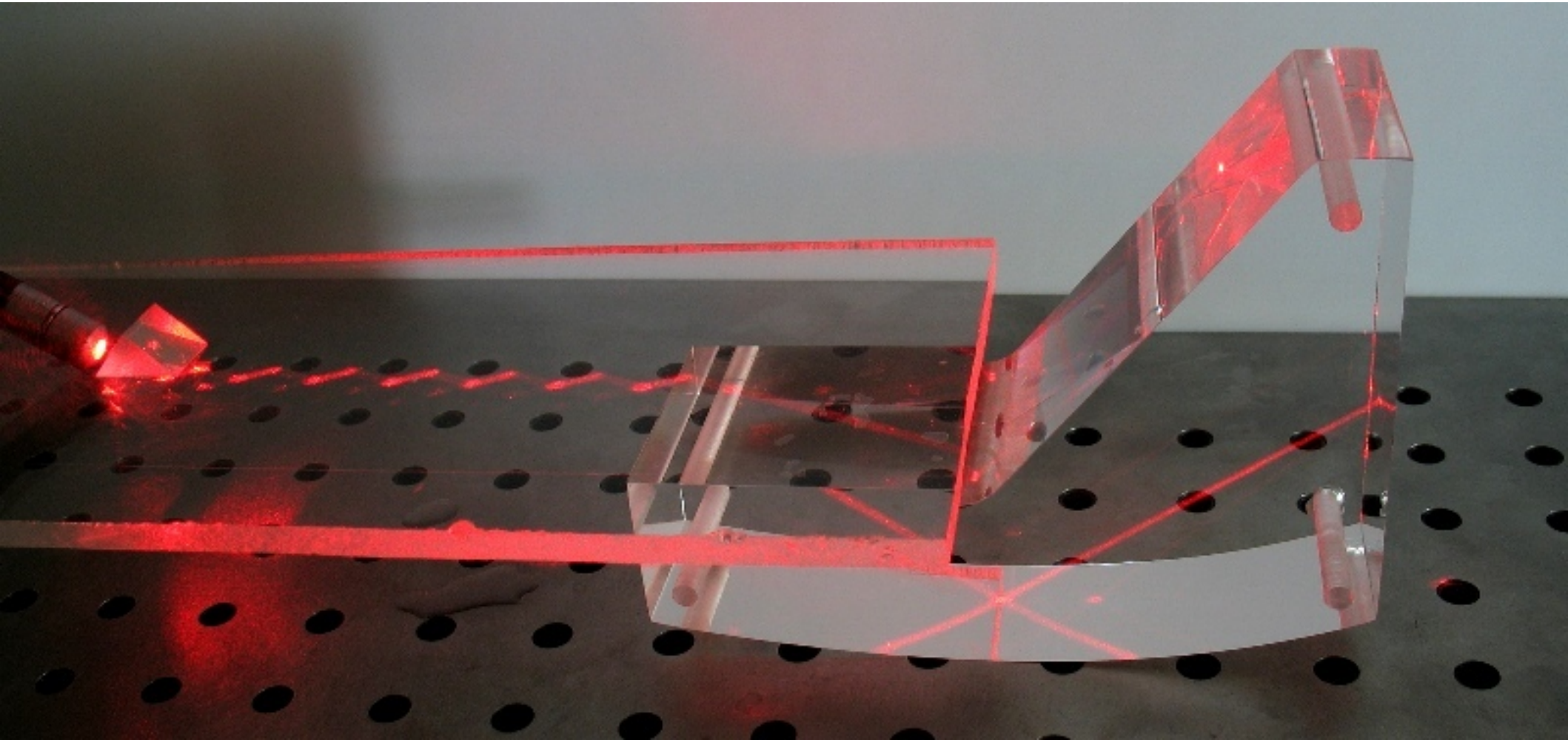


/data/physica_pcm/evoltnphasengroup1.eps



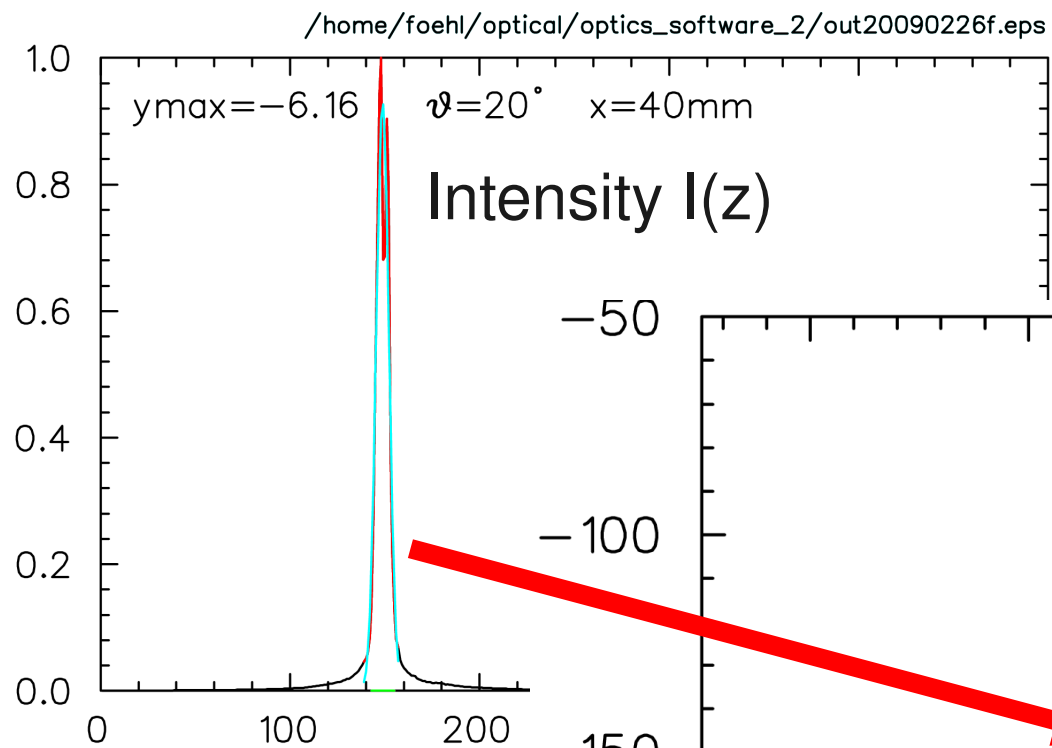
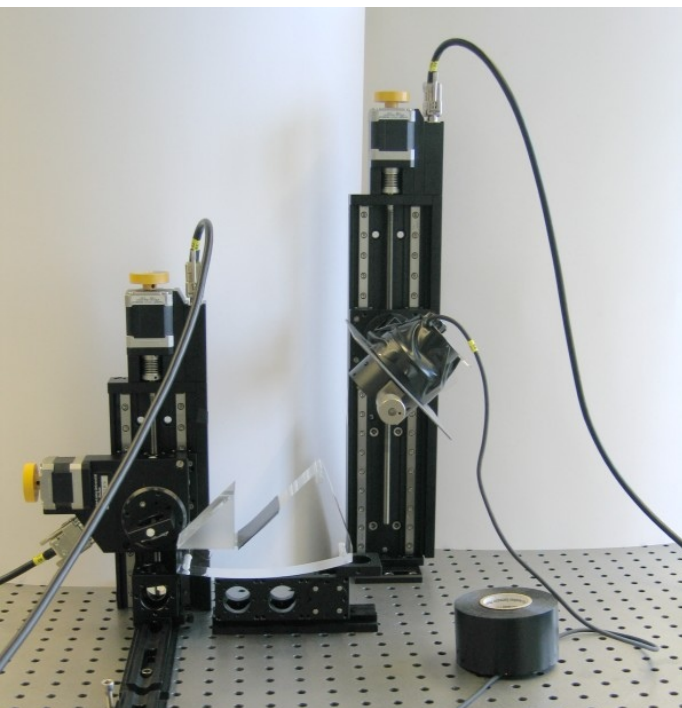
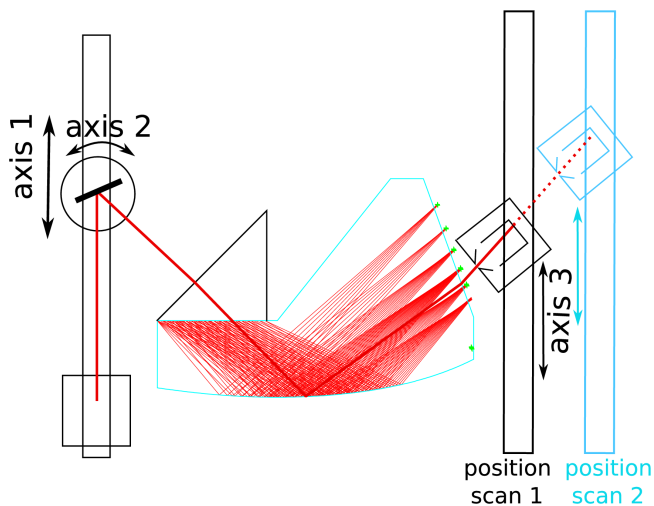
N.B. choice of corrector materials rather limited

Qualitative LG Assessment

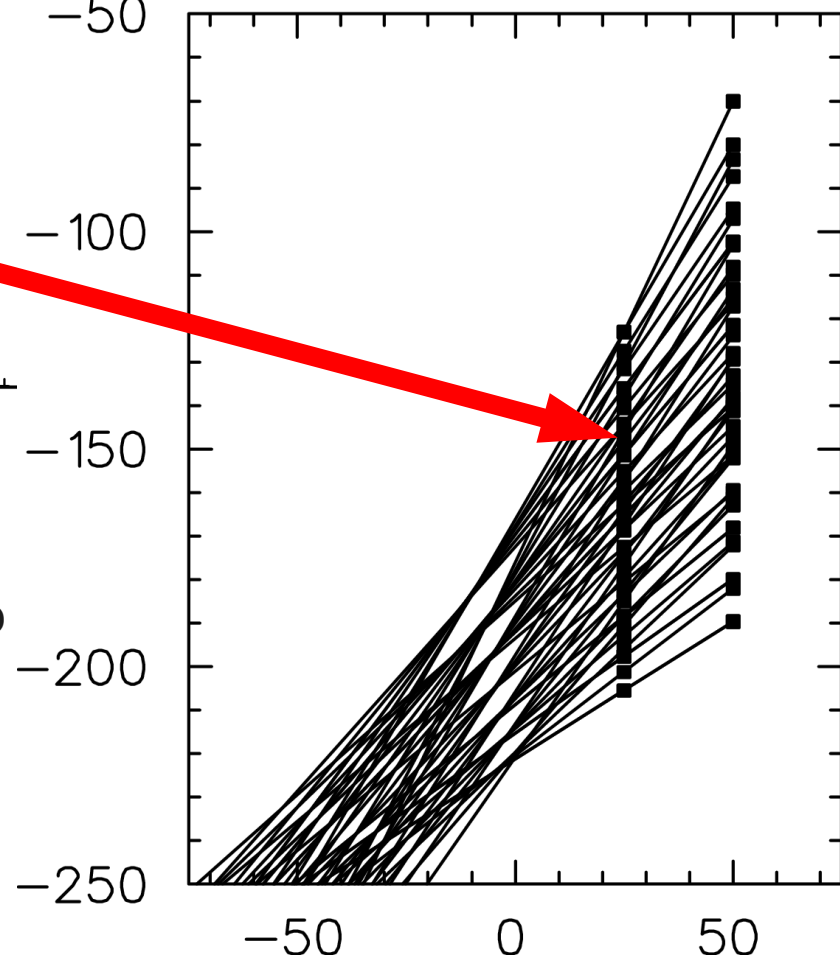


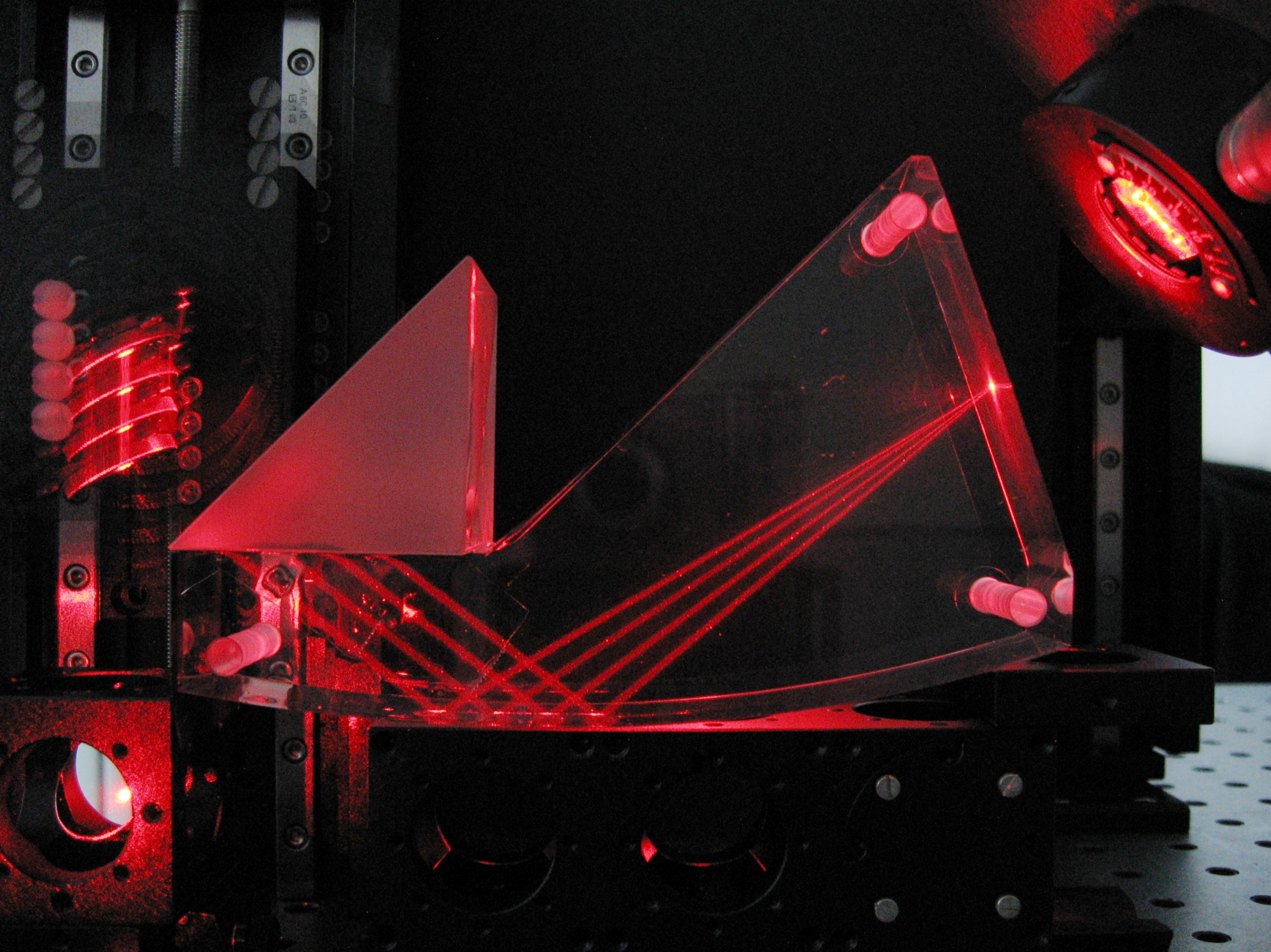
Quantitative LG Assessment

schematic setup 2009-02-25

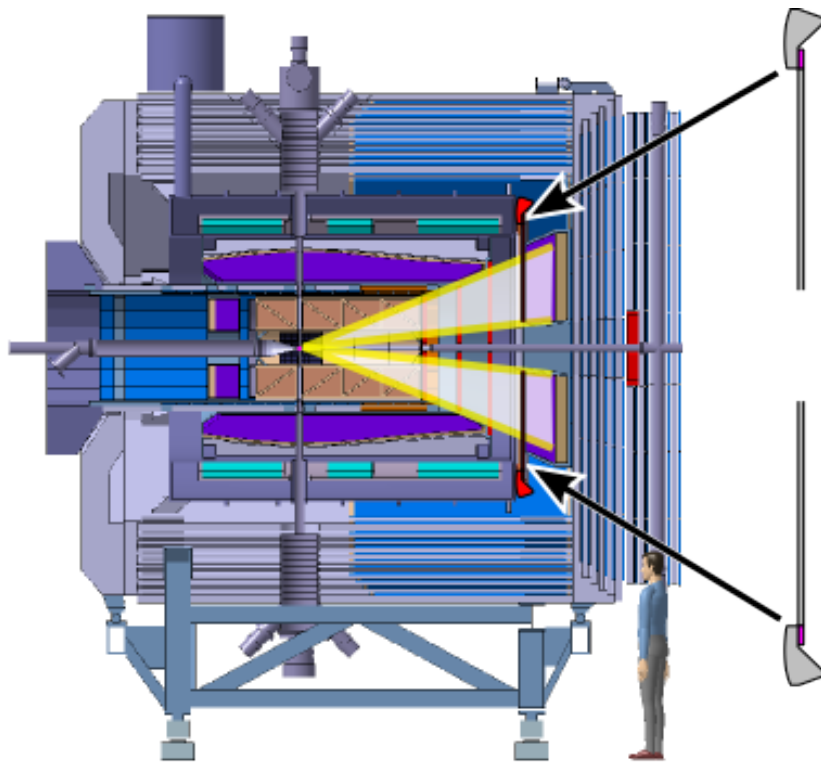


first demonstrator setup
to verify proper optics
of workshop machined
Focussing Light Guides



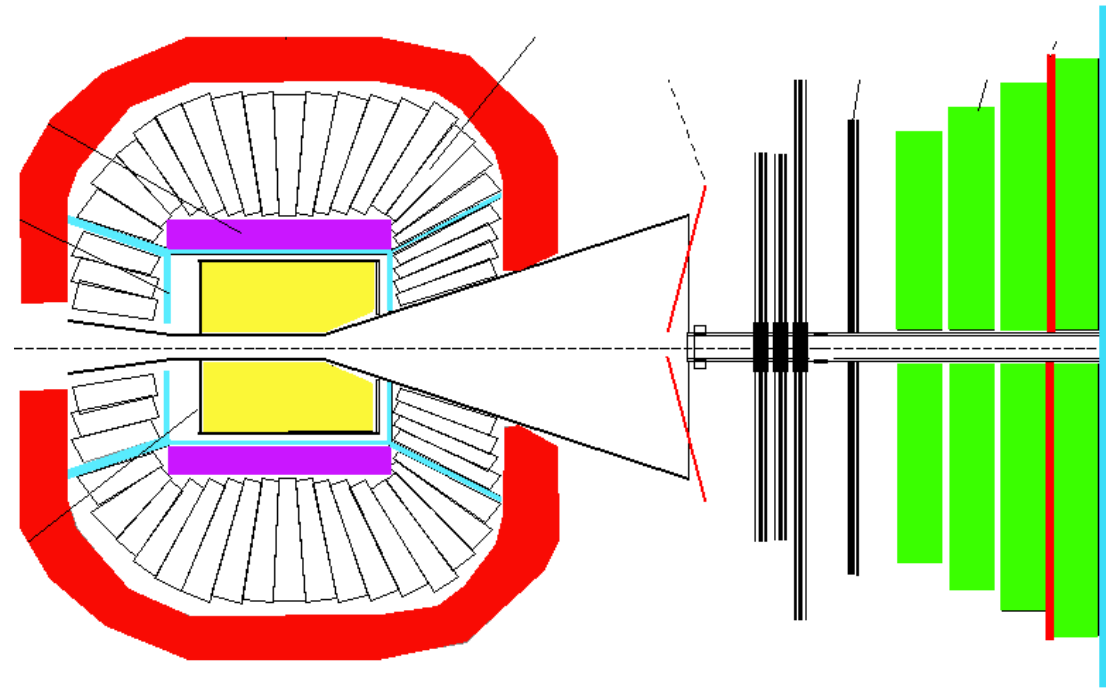


Experiments longing for “new” DIRC



PANDA Target Spectrometer

measure beta for PID

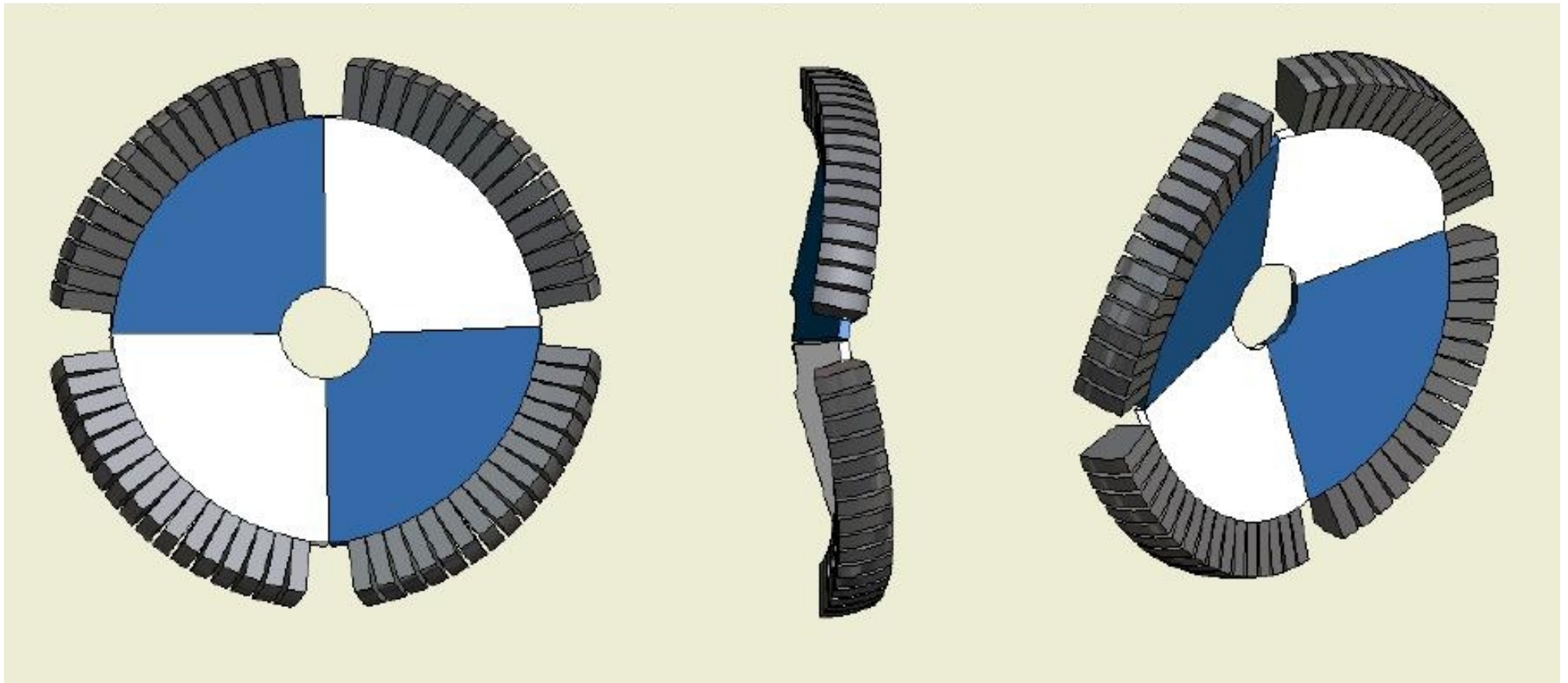


WASA experiment at COSY

measure beta for energy determination

forward phase space to cover: $\theta = 5-23^\circ$ for PANDA, $\theta = 3-17^\circ$ for WASA

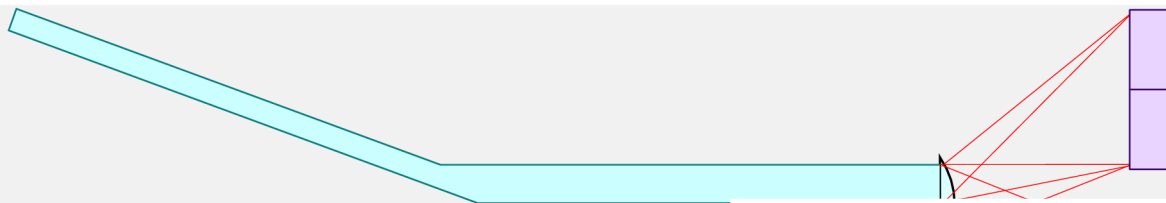
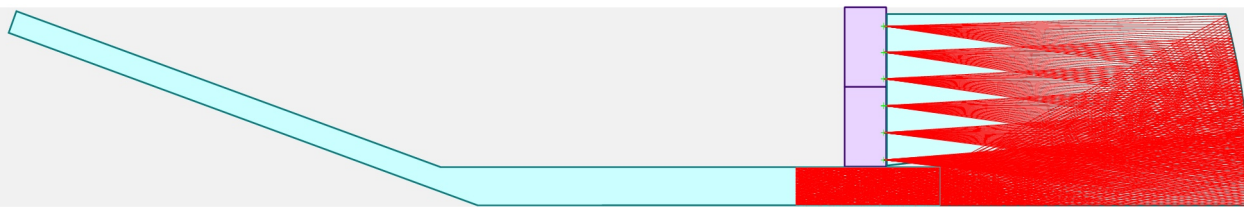
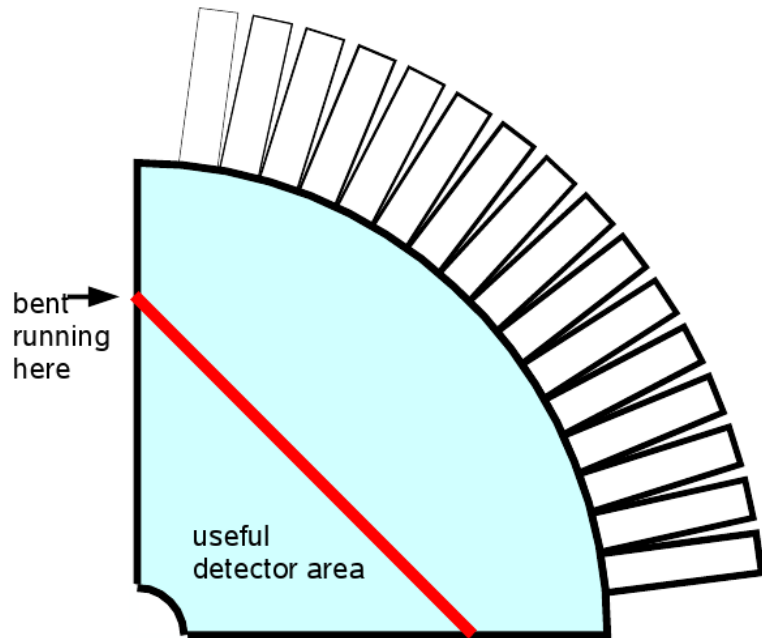
CEARA-Detektor



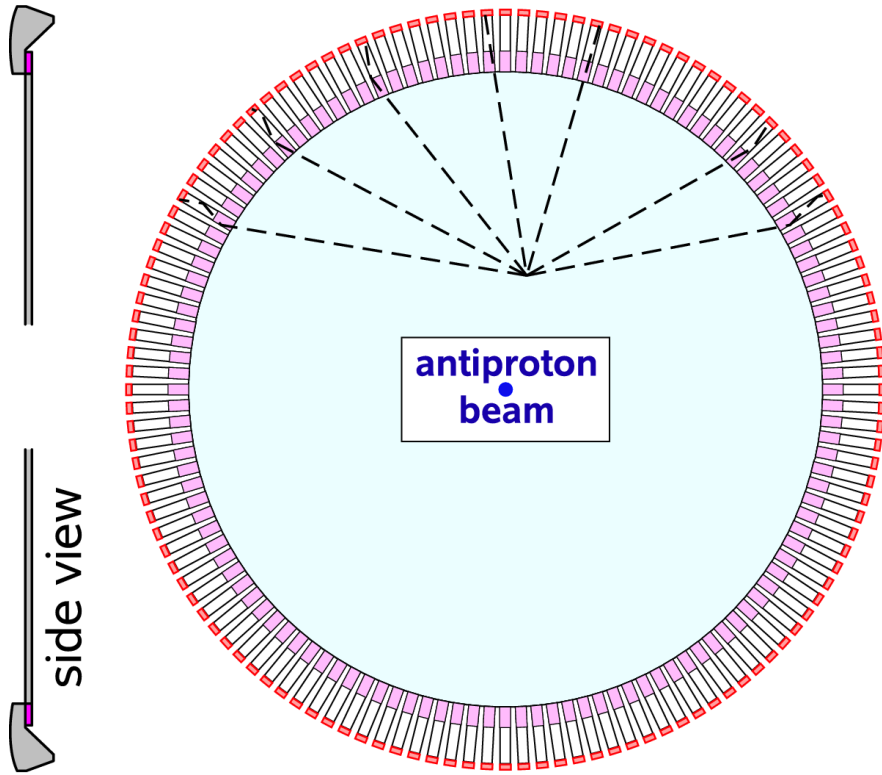
Cherenkov-**E**missions-**A**analysierender **R**ingscheiben-**A**pparat

WASA DIRC into 130mm wide layer

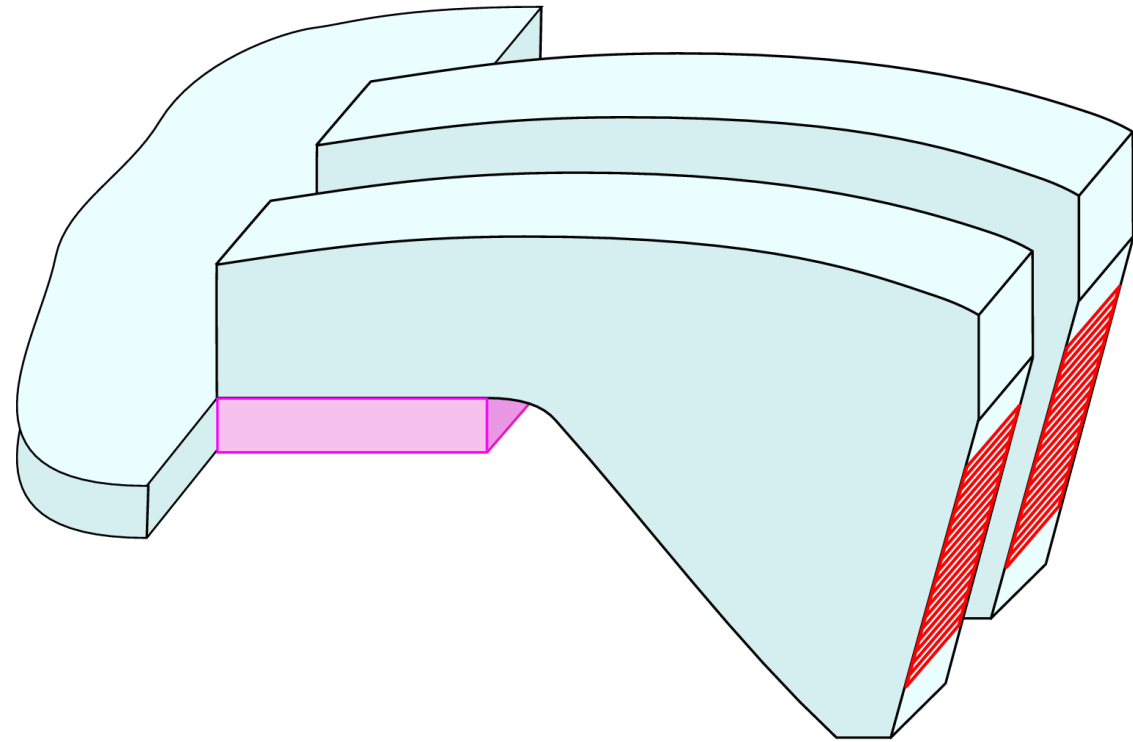
status of discussions December 2008:
fit a DIRC disc into a slice 130mm thick



Focussing Light Guide Disc DIRC



Disc DIRC seen from target



Lightguides with LiF - 3D visualisation

Expansion Volume - Effect

/local/home/foehl/klaus20081208dirc/assessradius_db.eps

