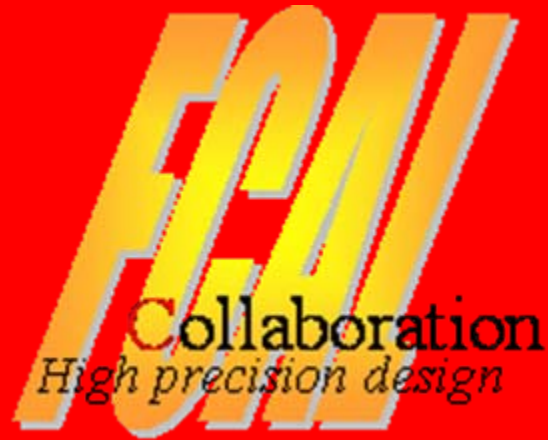
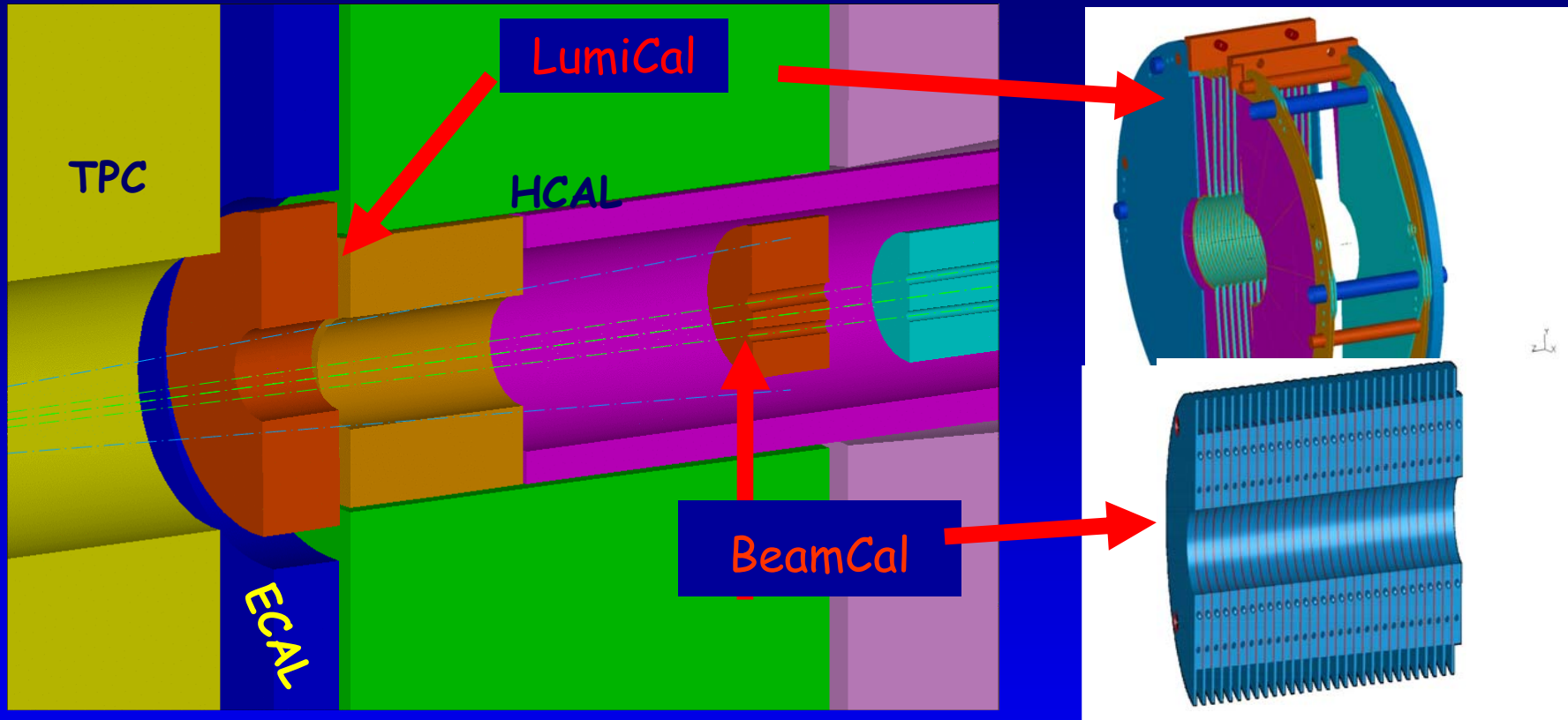


# LumiCal, the third very forward detector



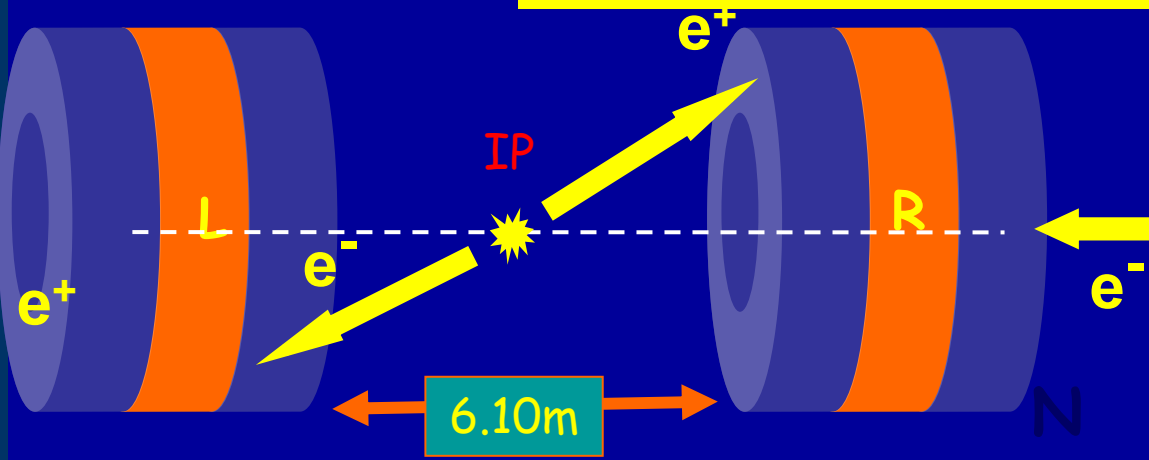
Wolfgang Lohmann,  
DESY

## BeamCal and LumiCal (Example LDC, 14 mrad):



- precise (LumiCal) and fast (BeamCal) luminosity measurement
- hermeticity (electron detection at low polar angles)
- mask for the inner detectors

# Measurement of $\mathcal{L}$

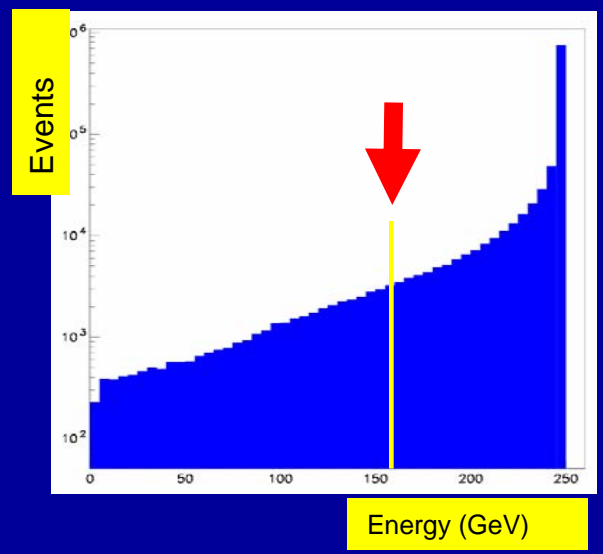
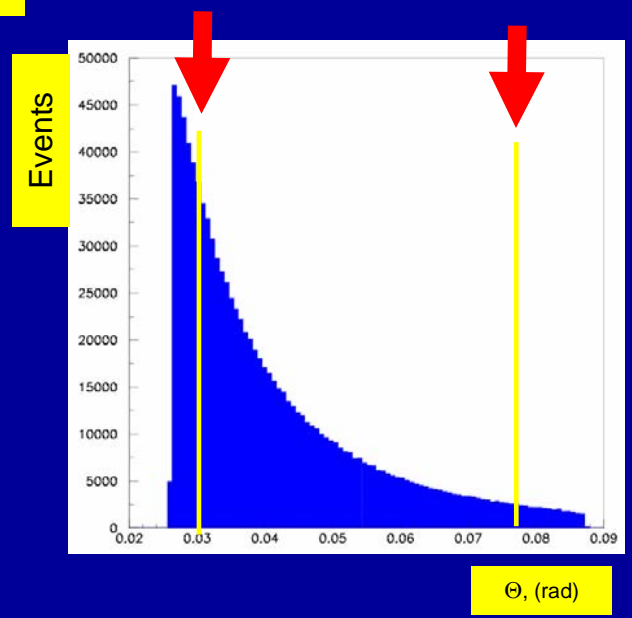
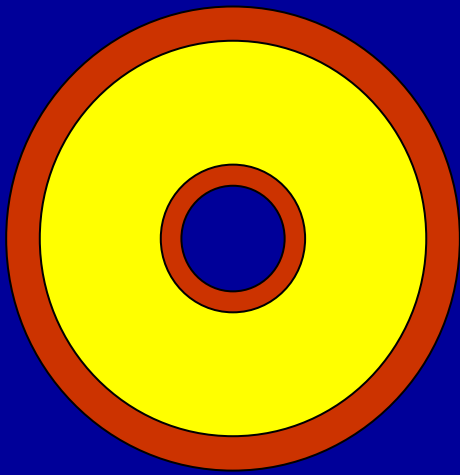


$$\mathcal{L} = N / \sigma$$

Count  
Bhabha  
events

From  
theory

Goal: Precision  $< 10^{-3}$

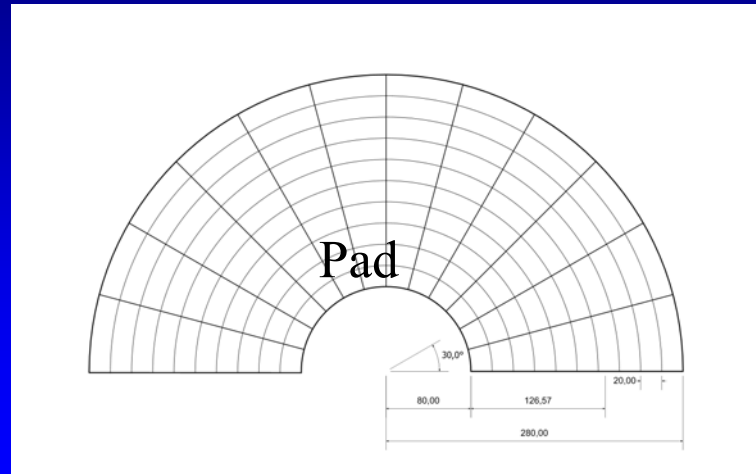
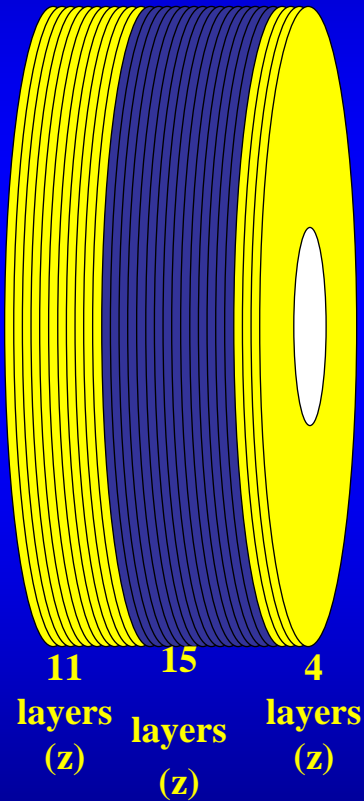


- Inner Radius of Cal.:  $< 10 \mu\text{m}$
- Distance between Cals.:  $< 600 \mu\text{m}$
- Radial beam position:  $< 1000 \mu\text{m}$

# LumiCal, present understanding

Maximum peak shower

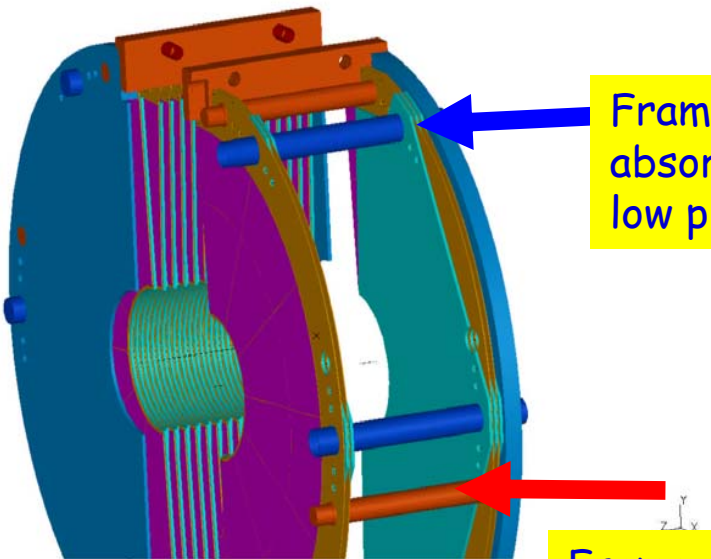
- 10 cylinders ( $\theta$ )
- 60 cylinders ( $\theta$ )



**64 cylinders**  
**120 sectors**  
**30 rings**

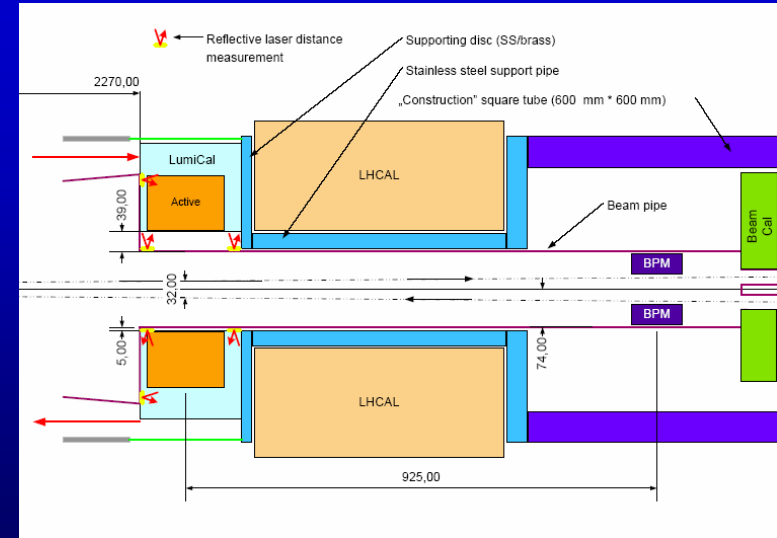
Parameter	Pad Performance
Energy resolution	25% ( $\sqrt{GeV}$ )
$\theta$ resolution	$3.5 * 10^{-5}$ rad
$\phi$ resolution	$10^{-2}$ rad
$\Delta \theta$	$\sim 1.5 * 10^{-6}$ rad
Electronics channels	25,200

# LumiCal mechanics and positioning



Frame for absorber disks, low precision

Frame for sensor positioning, high precision



- Reflective laser distance measurement - accuracy  $\sim 1\text{-}5\ \mu\text{m}$ , resolution  $\sim 0.1\text{-}0.5\ \mu\text{m}$
- Mirrors glued to beam pipe

- Beam pipe (well measured in lab before installing, temperature and tension sensors for corrections) with installed BPM
- Laser beams inside 'carbon' pipe (need holes, but possible)

# Forward Region, example LDC

