



MPI für Kernphysik Heidelberg



University of
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ERLANGEN CENTRE
FOR ASTROPARTICLE
PHYSICS



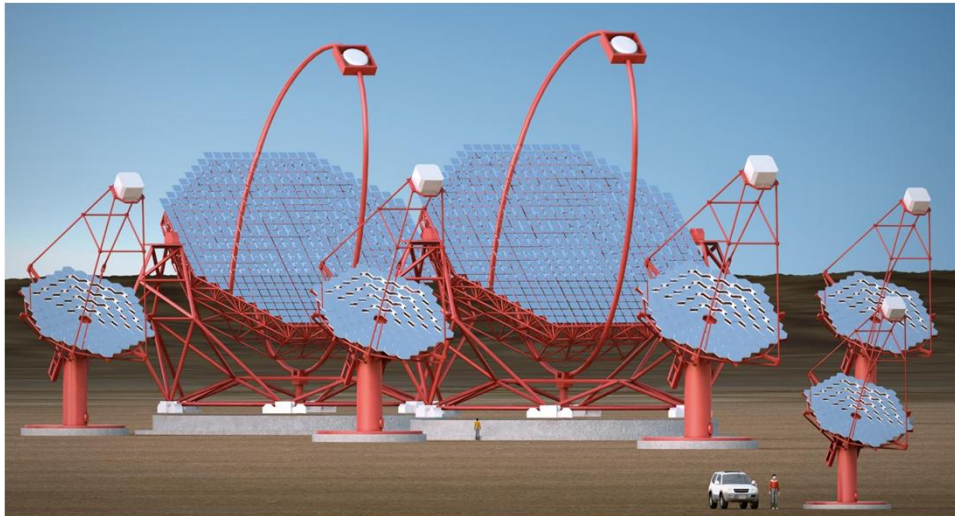
University of Innsbruck

Testing the FlashCam prototype camera for CTA

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Kernphysik, Heidelberg



- n Sensitivity factor 10 better than current experiments
- n FOV $5^\circ - 10^\circ$
- n Energy range $< 100 \text{ GeV} - > 10 \text{ TeV}$
- n Energy resolution $< 10 \% (> 1 \text{ TeV}) - < 25 \% (50 \text{ GeV})$
- n Angular resolution $0.05^\circ (> 1 \text{ TeV}) - 0.1^\circ (0.1 \text{ TeV})$



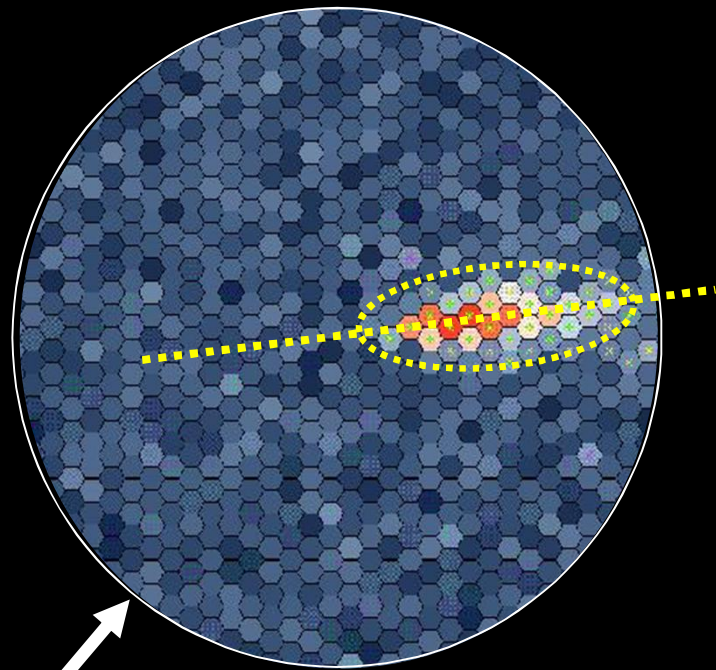
- n LST $O(400 \text{ m}^2)$
- n MST $O(100 \text{ m}^2)$
- n SST $O(10 \text{ m}^2)$

γ Ray
(100 GeV)

10 km

5 nsec

~ 120 m



Intensity

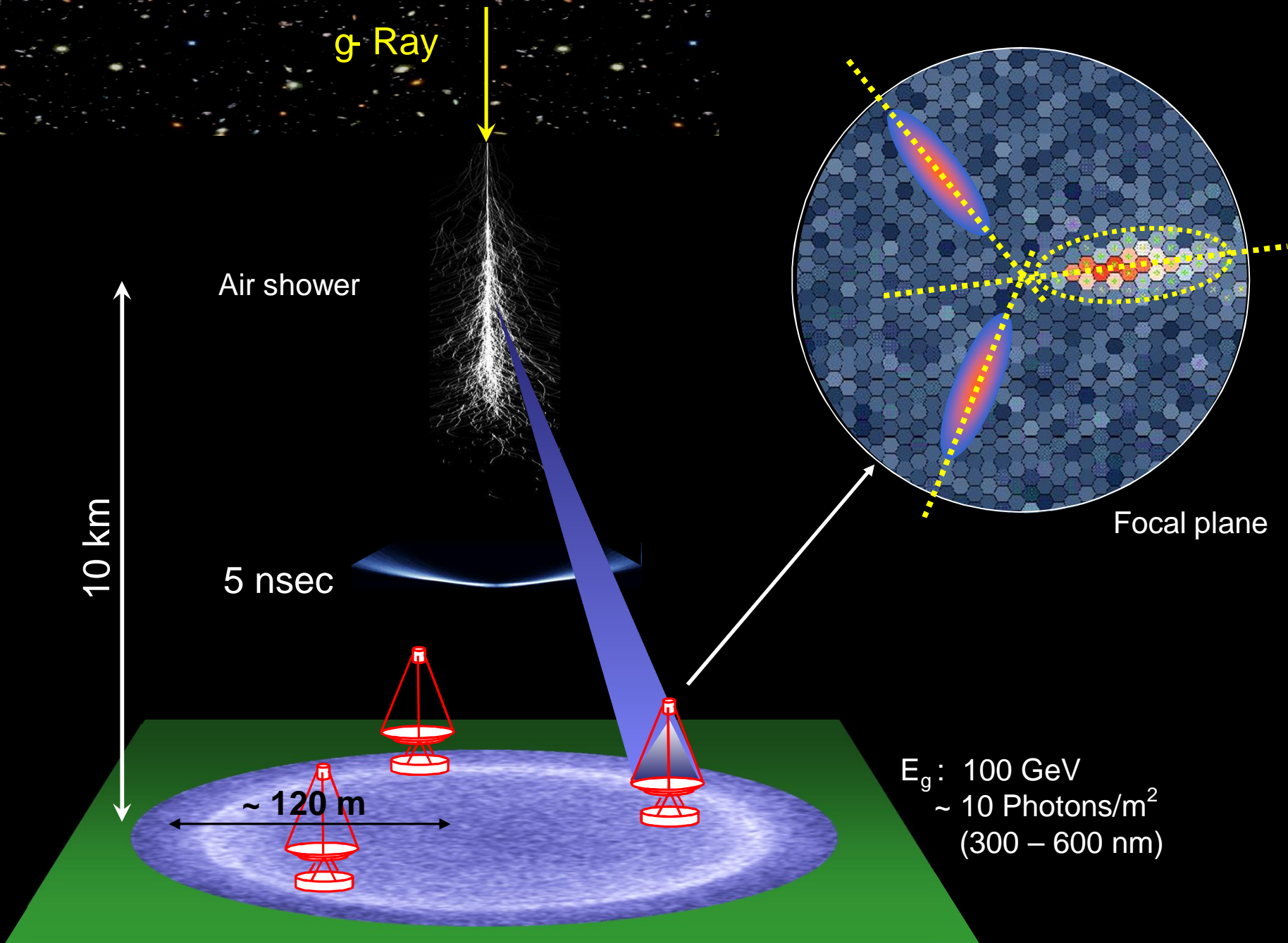
\hat{a} Primary Energy

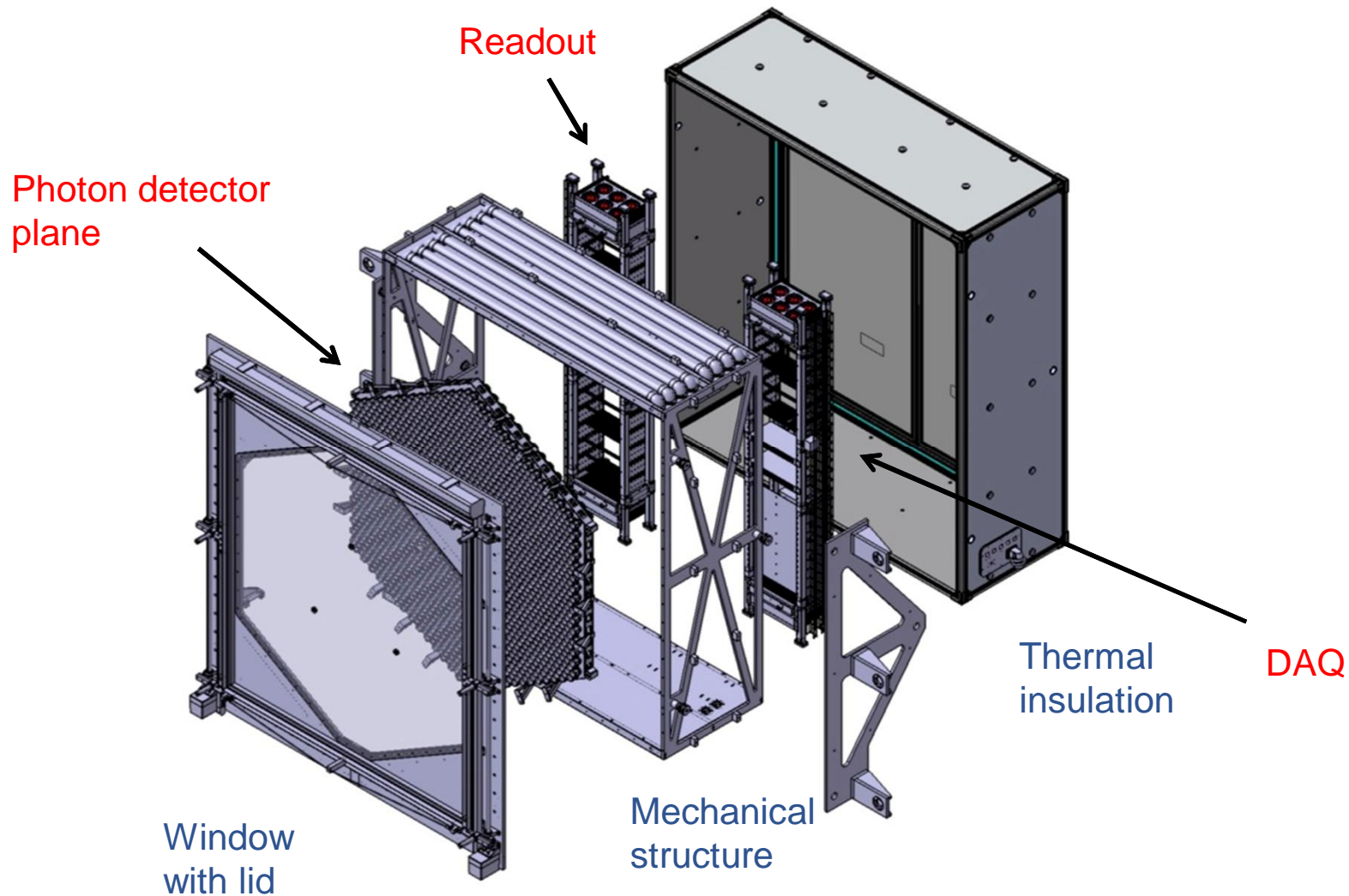
Image Axis

\hat{a} Shower Direction

Image Shape

\hat{a} Type of Particle



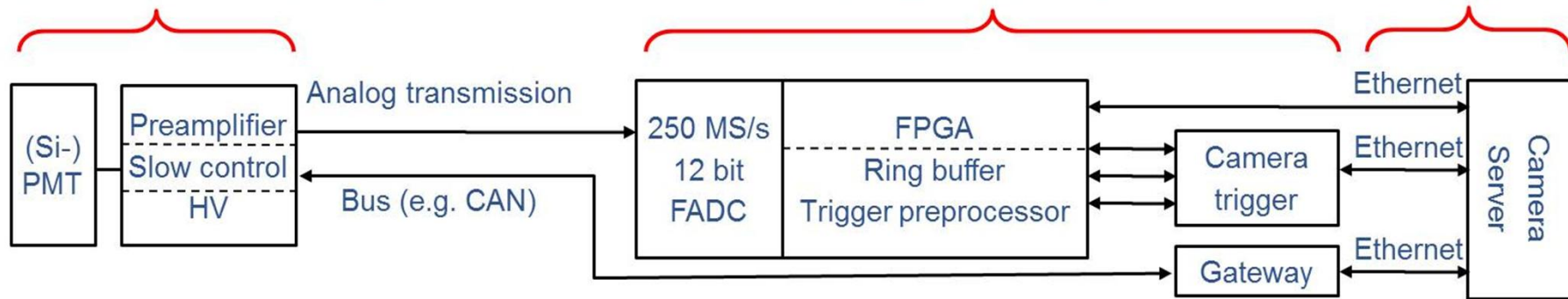




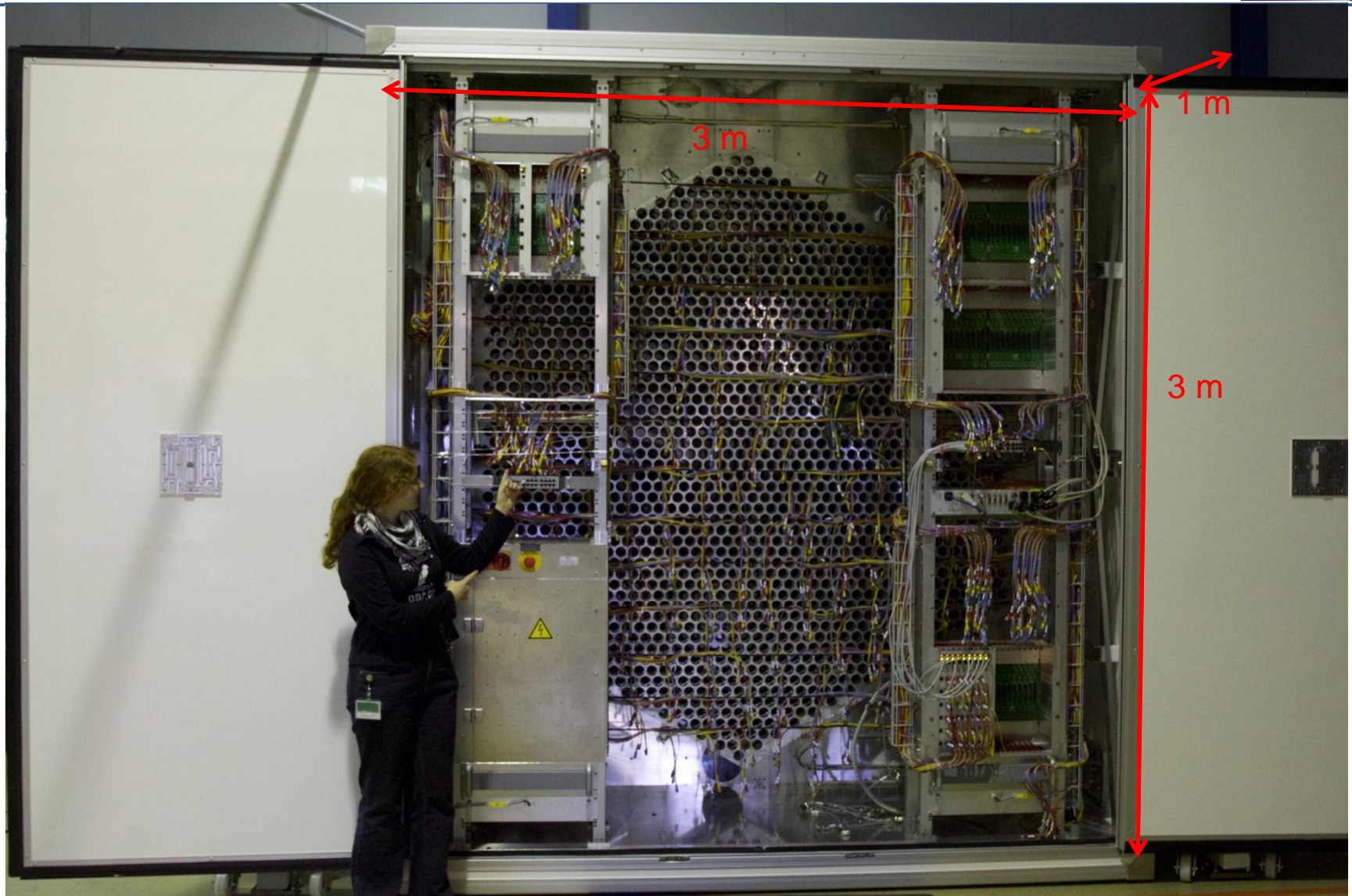
Photon Detector Plane

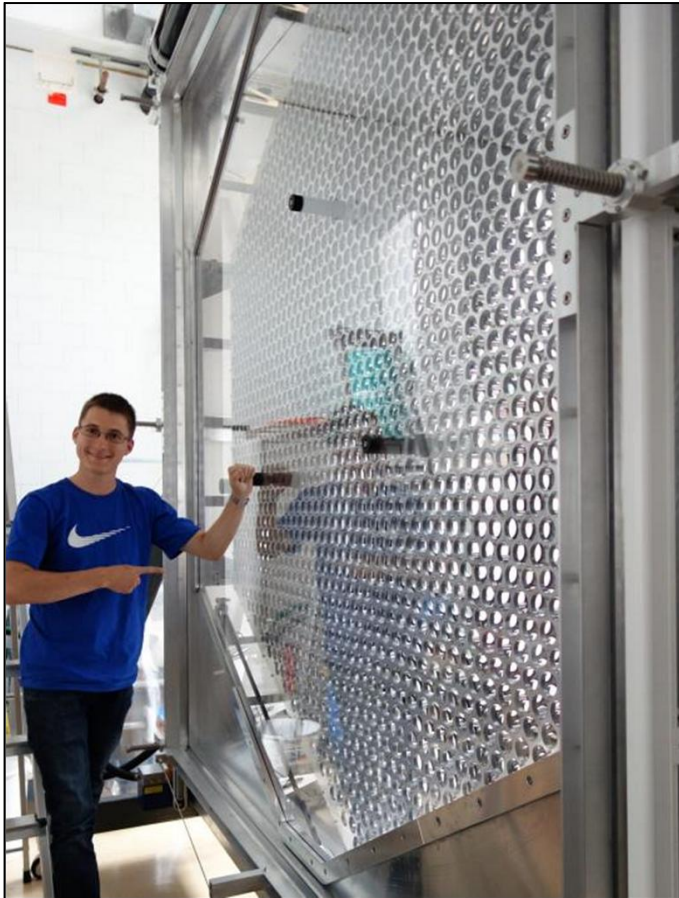
Readout Electronics

DAQ



FlashCam prototype: Rear view





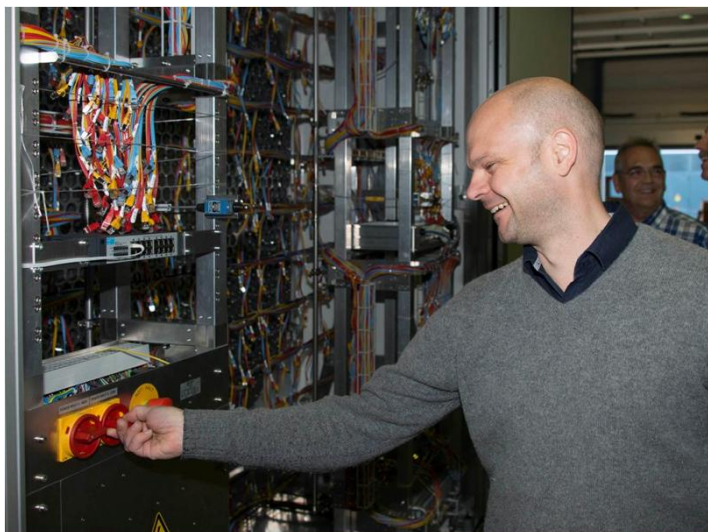
Entrance window



Lid closed



Mechanics test at prototype telescope (June/July 2015)



FlashCam: Testing the prototype camera



Camera arrival at MPIK (July 2015)

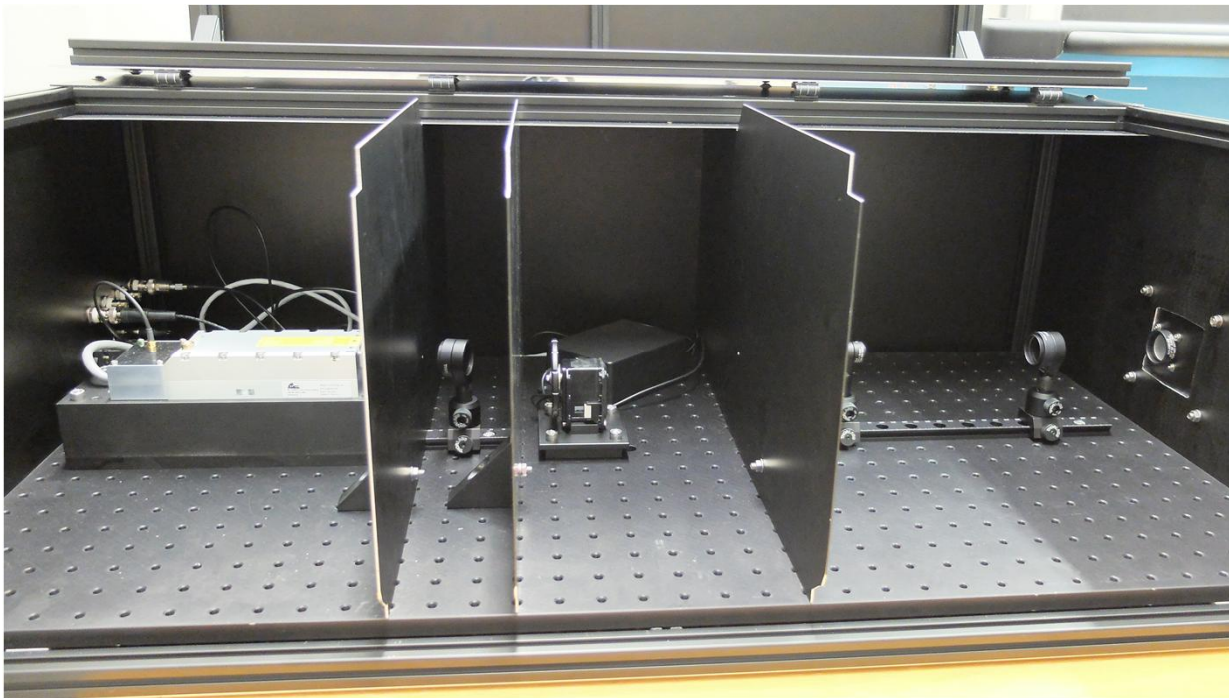


Goals

- n Full understanding of the prototype camera
- n Find possible sources of errors in an early state
- n Build calibration devices

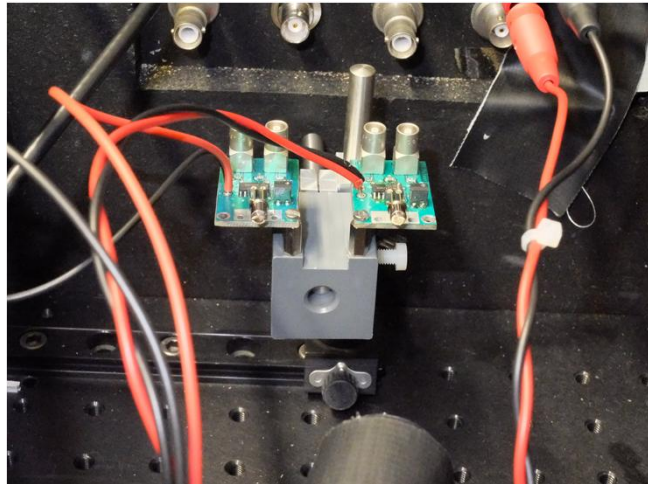
Requirements

- n Create pulses with width of about ns
- n Cover full dynamic range (0 to 3000 PE/Pixel)
- n Stable and maintainable

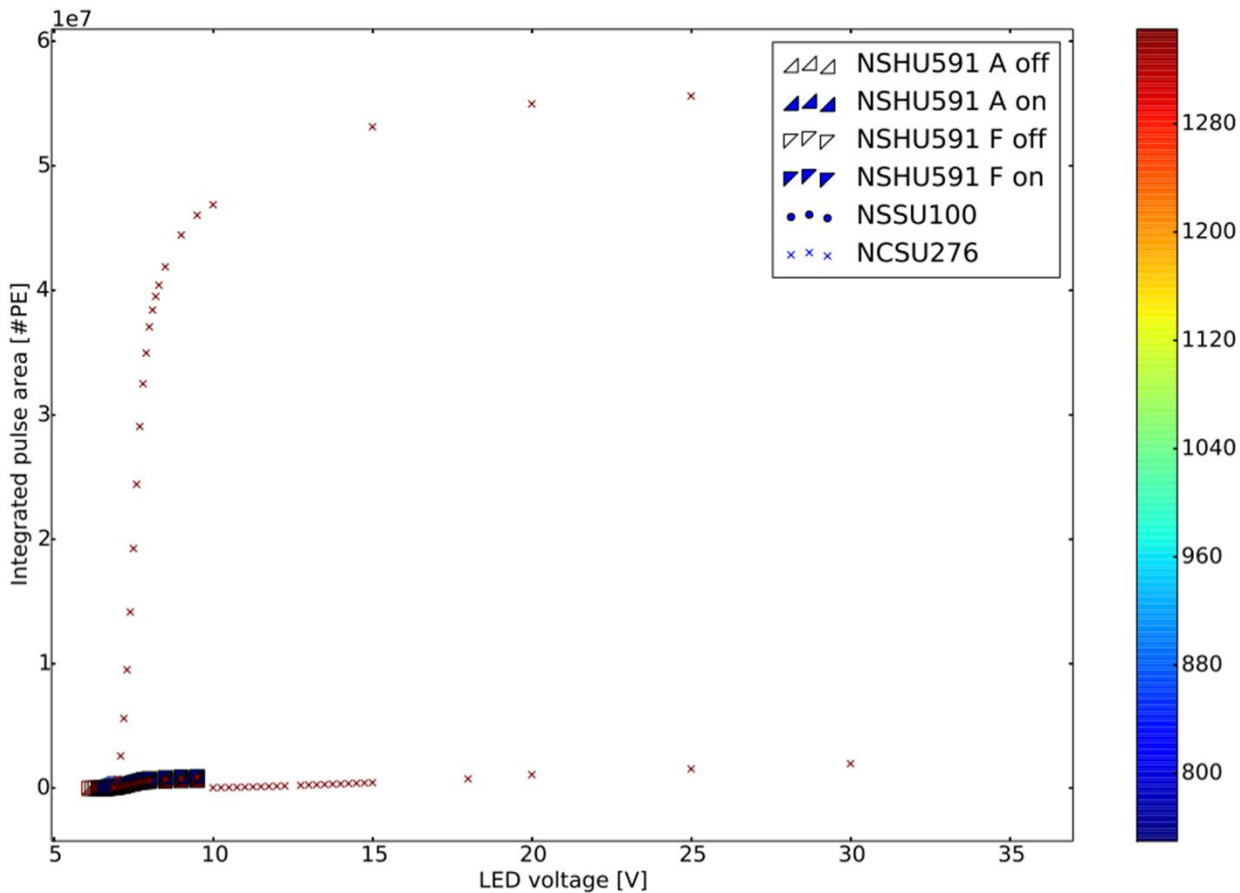


- n Creates ns pulses
- n $\lambda = 355$ nm
- n 4 orders of magnitude
- n Movable in telescope structure

Laser Intensity filter Filter wheel Lens system w diffuser

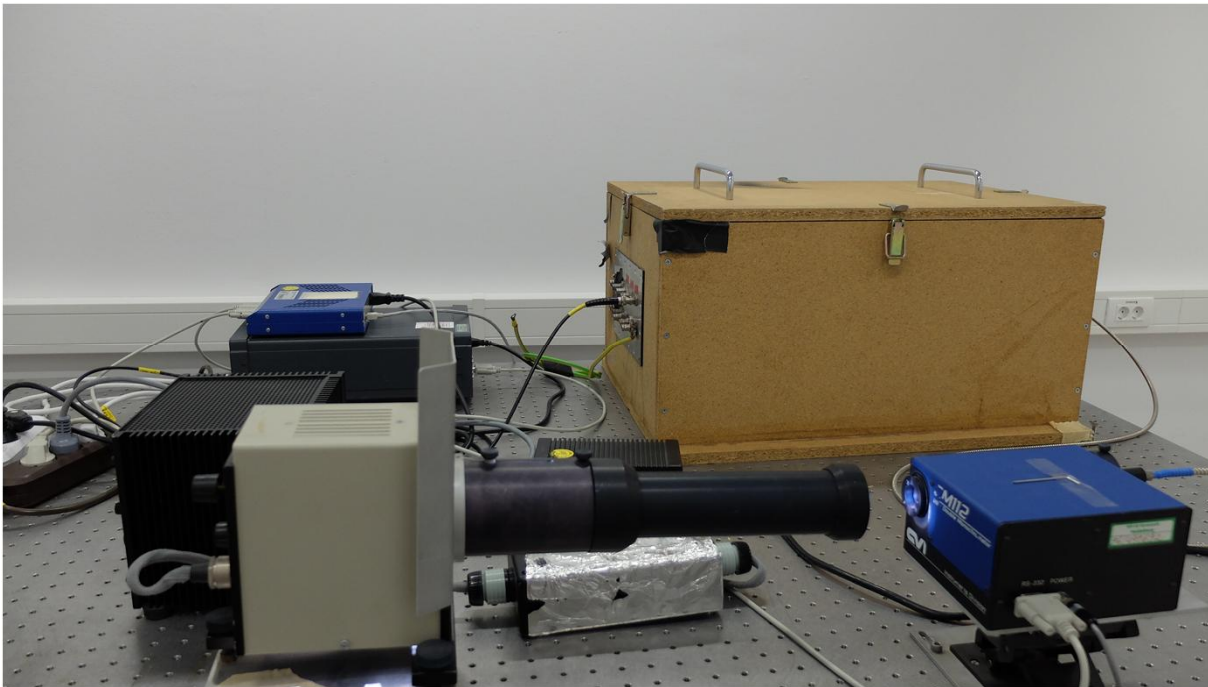


- n Creates few ns pulses
- n $\lambda = 375 \text{ nm}$
- n Mountable inside camera





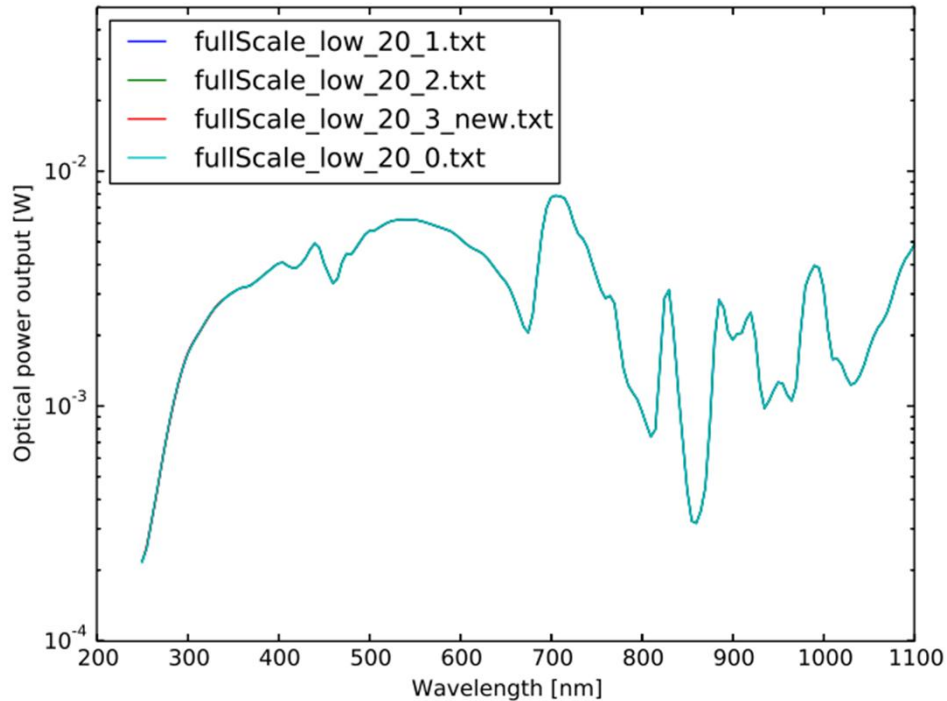
Power meter Com server Dark box with photodiode



- n DC light source
- n Continuous λ spectrum
- n Laboratory setup only
- n Wavelength dependent measurement

Xe lamp

Monochromator
with optical fiber



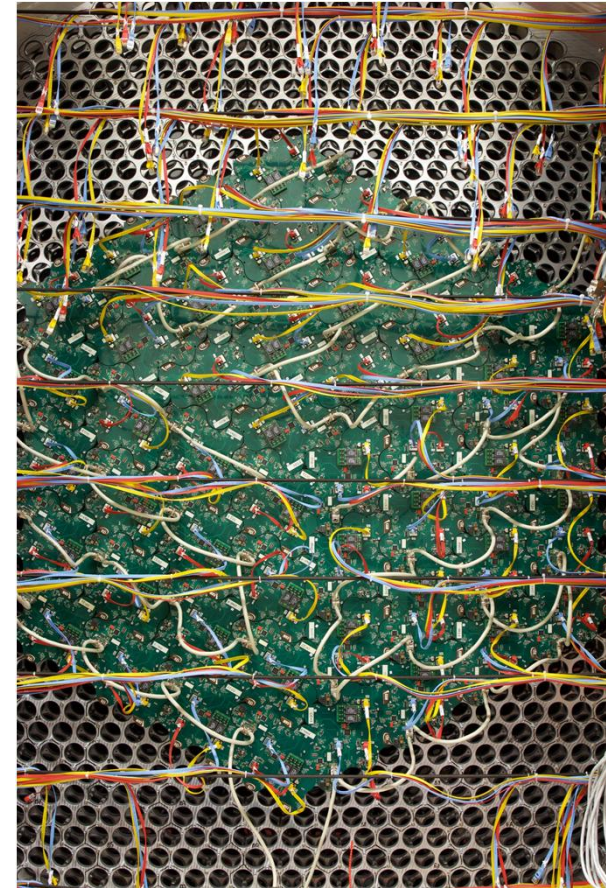
Optical output per wavelength coming from the Xe lamp



Ulbricht sphere (Gigahertz Optik) for homogeneity



- n FlashCam is a fully digital camera for CTA MSTs
- n Prototype will be tested and calibrated in Heidelberg
- n Actually three calibration devices are testing





FlashCam: A fully digital camera for CTA



Thank you for listening!