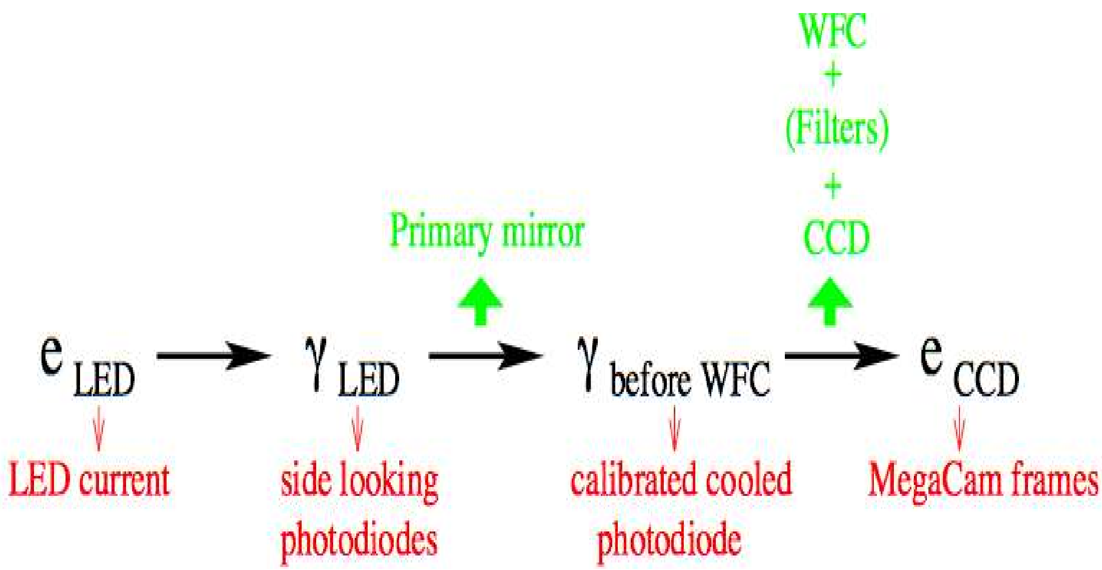
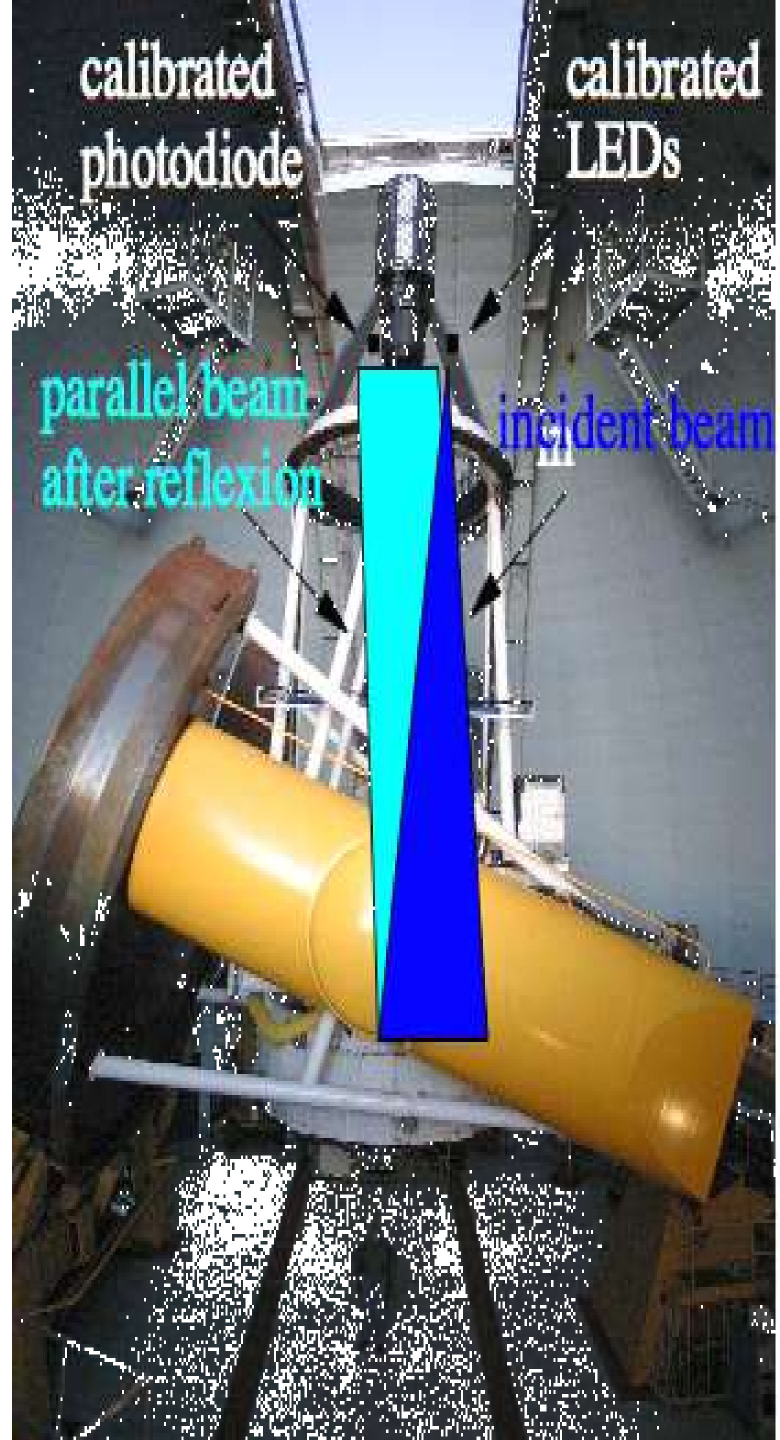
Data Analysis

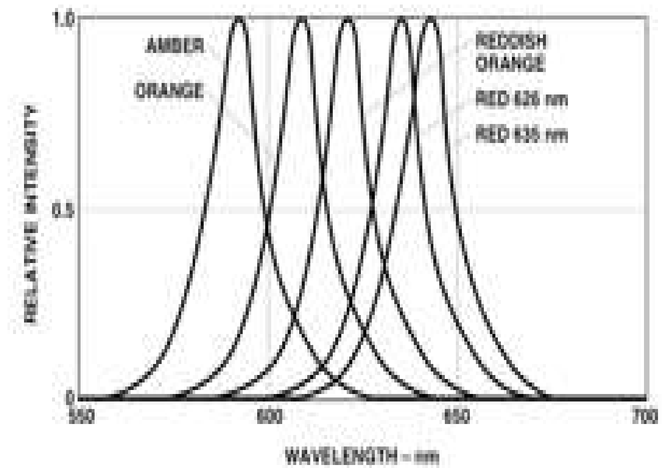
Measurement Points





Calibration Data Acquisition Procedure

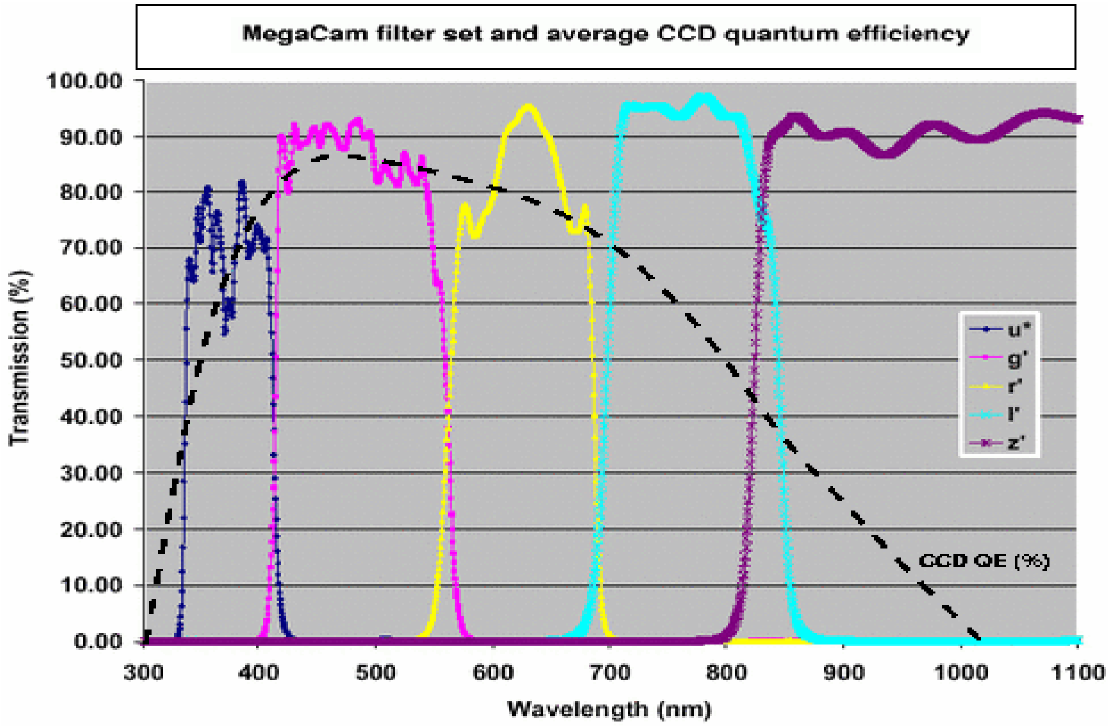
- LED(s) light ON
- Check of calibration parameters (currents, photocurrents, temperature)
- Megacam frames acquisition
- LEDs light OFF
- Megacam frames (background)
- Mean and sigma values of calibration parameters
  ➔ corresponding image header



⬇

$$R(X,t,\lambda,x,y)$$

Throughput monitoring



$\approx$ 20 monitoring points

$$R(X,t,\lambda_k,x,y) = T_{opt}(t,\lambda_k,x,y).T_{filt\,X}(t,\lambda_k,x,y).QE(t,\lambda_k,x,y).G$$

k =1 to 20

Non uniformity of the camera

$$R(X,t,\lambda,x,y) = T_{opt}(t,\lambda,x,y).T_{filt\ X}(t,\lambda,x,y).QE(t,\lambda,x,y).G$$

$$N^{ADU}_{x,y}(X,t,\Delta t) = \int \Phi_{LEDs}(t,\lambda).T_{opt}(t,\lambda,x,y).T_{filt\ X}(t,\lambda,x,y).QE(t,\lambda,x,y).G.\ \Delta t.d\lambda$$

- $\Phi_{LED}(t,\lambda)$ several LEDs light $(\Sigma\alpha_k\ f_k(\lambda))$

➔ "varying color" flat

- $R(X, t, \lambda, x, y)$: non uniformity of

Optics (plate scale) + Filter X + QE

Filters

- Measurement without filter ➔ $T_{opt}(t,\lambda,x,y).QE\ (t,\lambda,x,y).G$

⬇

$T_{filt\ X}\ (t,\lambda,x,y)$ in situ

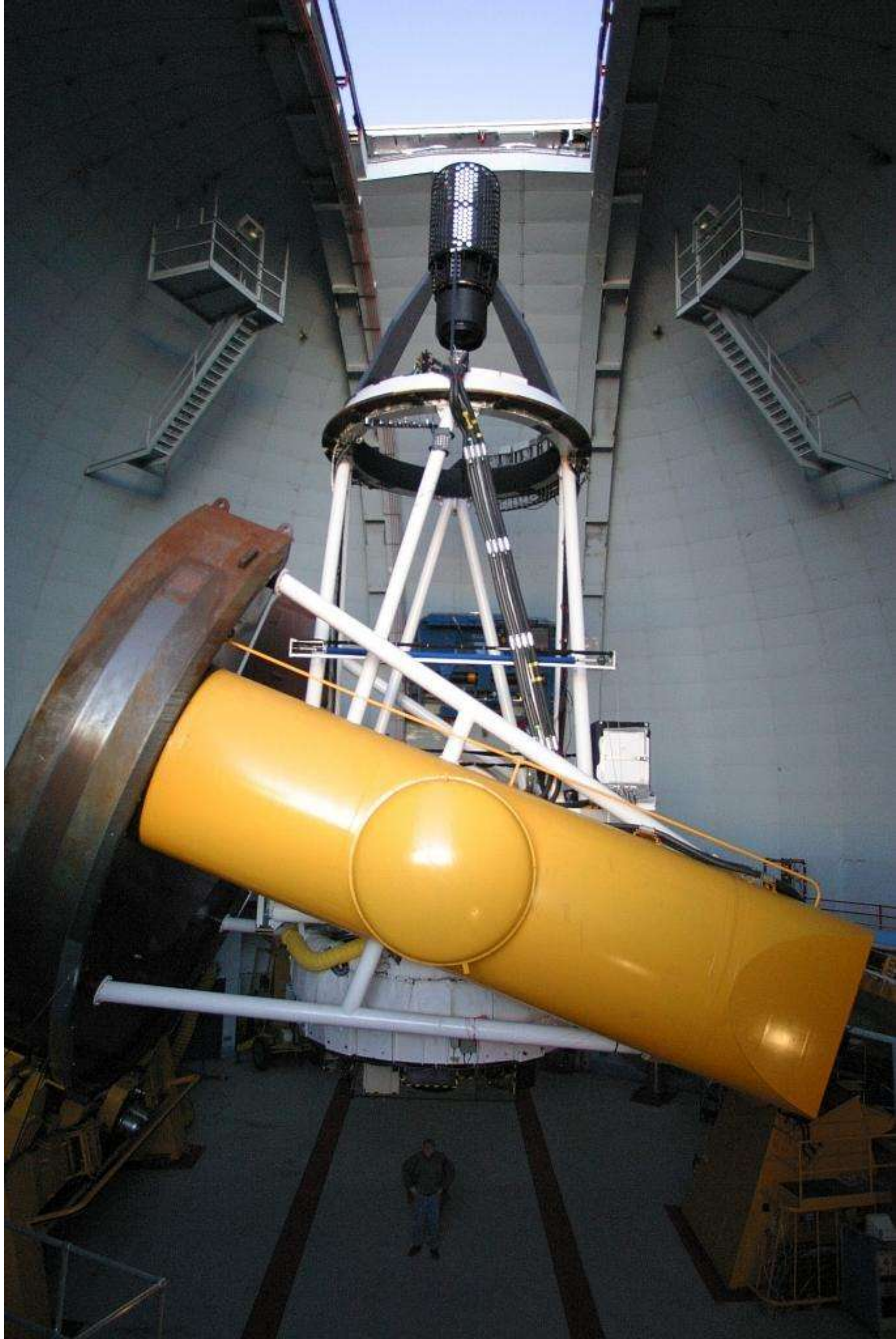
- "Plate scale" : dense star fields (psf) ➔ $T_{opt}(t,\lambda,x,y)$

⬇

$T_{opt}(t,\lambda,x,y)$, $T_{filt\ X}\ (t,\lambda,x,y)$ and $QE\ (t,\lambda,x,y).G$ separatly

Scattered light measurement

$$\frac{R_{twilight}(X,t,\lambda,x,y)}{R_{LED}(X,t,\lambda,x,y)} \Leftrightarrow \frac{Flat_{twilight}(X,t,\lambda,x,y)}{Flat_{LED}(X,t,\lambda,x,y)}$$



"Absolute colors"

$$N^{ADU}_{x,y}(X,t,\Delta t) = \int \Phi(t,\lambda).T_{atm}(Z,t,\lambda).A.T_{opt}(t,\lambda).T_{filt\,X}(t,\lambda).QE(t,\lambda,x,y).G.\,\Delta t.d\lambda$$

$$N^{ADU}_{x,y}(X,t,\Delta t) = \int \Phi_{LED}(t,\lambda).T_{opt}(t,\lambda).T_{filt\,X}(t,\lambda).QE(t,\lambda,x,y).G.\,\Delta t.d\lambda$$

$$Flat(X, x, y, \Sigma\alpha_k f_k(\lambda))$$

$$=$$

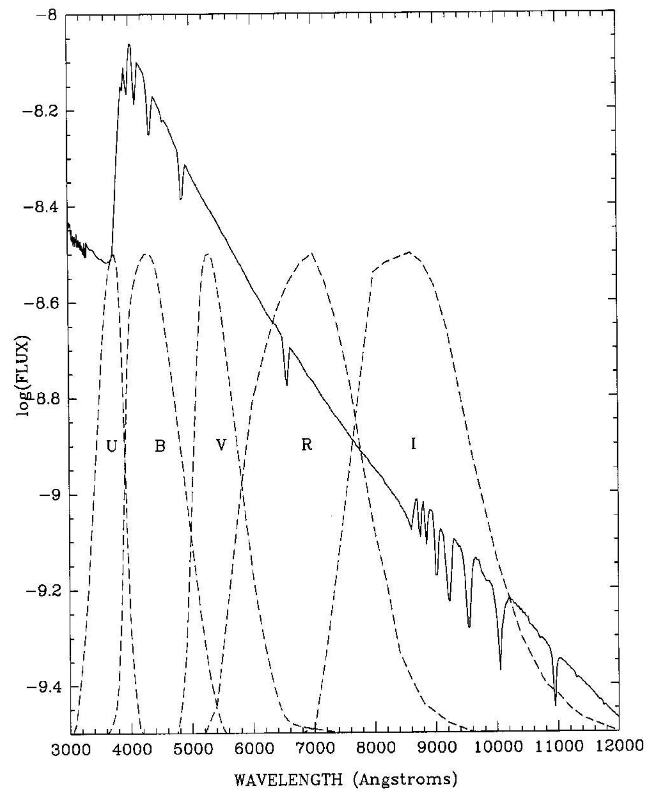
$$K.R(X, x, y, \Sigma\alpha_k f_k(\lambda))$$

$Flat(X)/Flat(X')$

compare

fluxes(X) with fluxes(X')

AT TELESCOPE LEVEL



"Absolute" colors

$R(t,\lambda) + T_{atm}(Z,t,\lambda)$

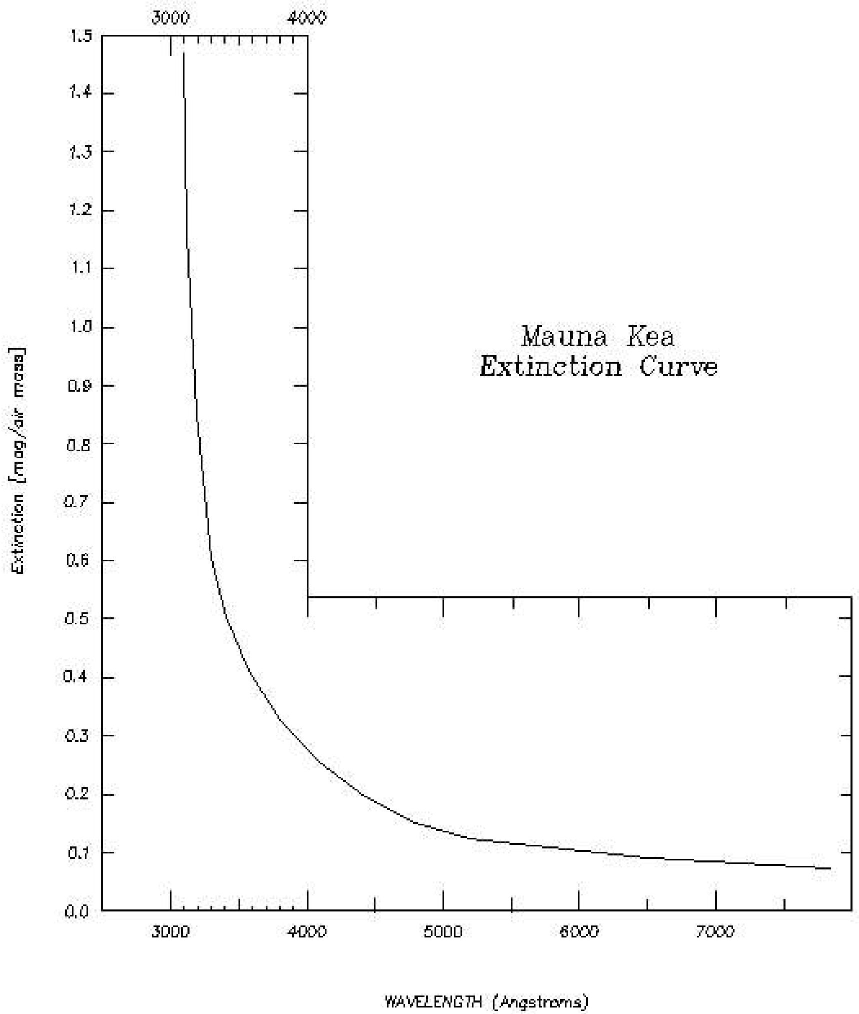
↓

Hubble diagram without ref star spectrum

(+ Photometric redshifts)

⇒ Atmospheric transmission measurement

⇒ Study of atm. effects



Conclusion

- Monitoring of the throughput
  (complementary with fine sampling)
- Investigation of instrument
  (instrumental systematics studies)
- "Absolute colors" (atmosphere studies)
- Difficult to quantify the benefit but such an instrumental calibration becomes unavoidable