

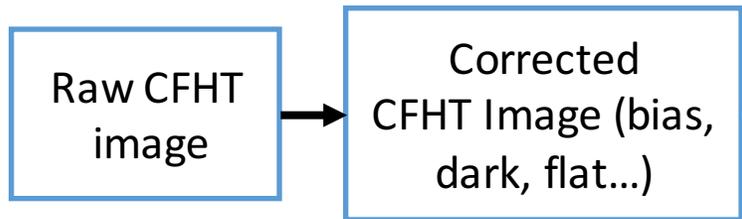
Validate_drp

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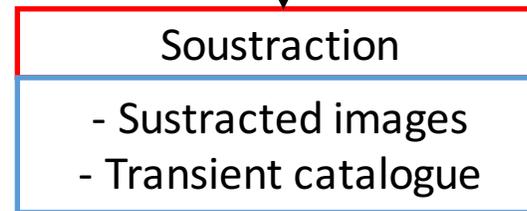
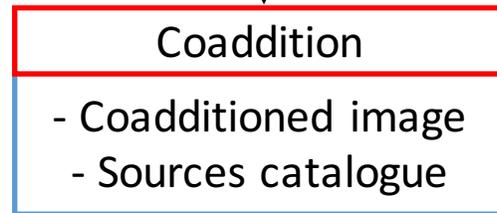
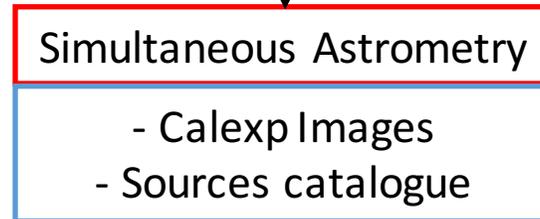
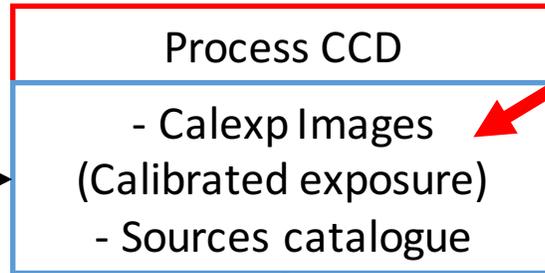
LSST France
Grenoble
Session Supernova
8-9 juin 2016

Stack Big Picture :

validate_drp



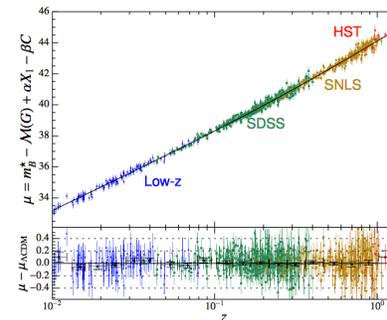
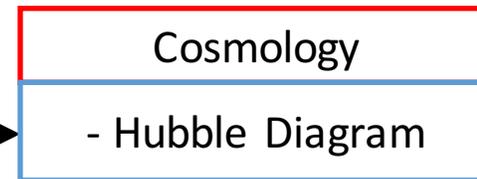
Stack L1



Stack L2



Stack L3



validate drp

- Package in GitHub (D.Boutigny and M. Wood-Vasey)
- Evaluate an output data repository (process CCD) against LSST Science Requirements Document (<http://ls.st/LPM-17>) Key Performance Metrics
- Assess expected analytic models for photometric and astrometric performance following the LSST Overview paper (<http://arxiv.org/abs/0805.2366v4>)

validate drp inputs :

- Calibrated exposure source catalog
- Configuration file that specifies dataids (filters, visits, ccds) to process and validation parameters
 - Minimal Signal/Noise ratio
 - Expected astrometric variability [mas]
 - Expected photometric variability [mmag]
 - Requirements: PA1, PF1, PA2, AM1, AF1, AM2, AF2, AM3, AF3

Validation photometry parameters :

- RMS of the unresolved source magnitude distribution around the mean value (repeatability) should not exceed PA1 (millimag).
- No more than PF1 % of the measurements will deviate by more than PA2 millimag from the mean.

Validation astrometry parameters :

- RMS of the astrometric distance distribution for stellar pairs with separations of D arcmin (repeatability) ($x=1,2,3 \rightarrow D=5, 20, 200$ arcmin) (milliarcsec) should not exceed AM x ($x=1,2,3$).
- No more than AF x ($x=1,2,3$) % of the sample should deviate by more than AD x milliarcsec from the median.

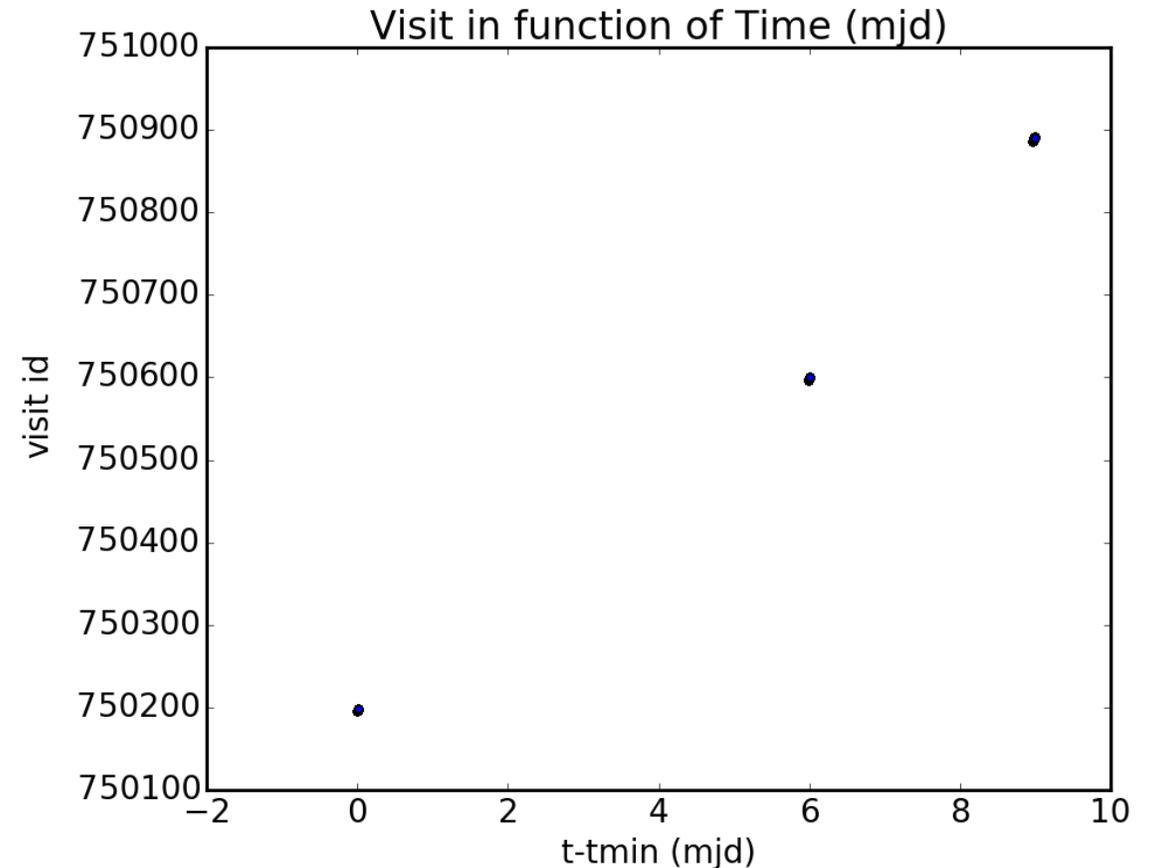
Validate drp on 16 visits, on the 36 ccds and r filter (PsfFlux):

- Input:

- Min Signal/Noise ratio : 100
- Expected astrometric variability : 25 mas
- Expected photometric variability : 25 mmag
- Requirements : **LSST SRD « design » requirements**

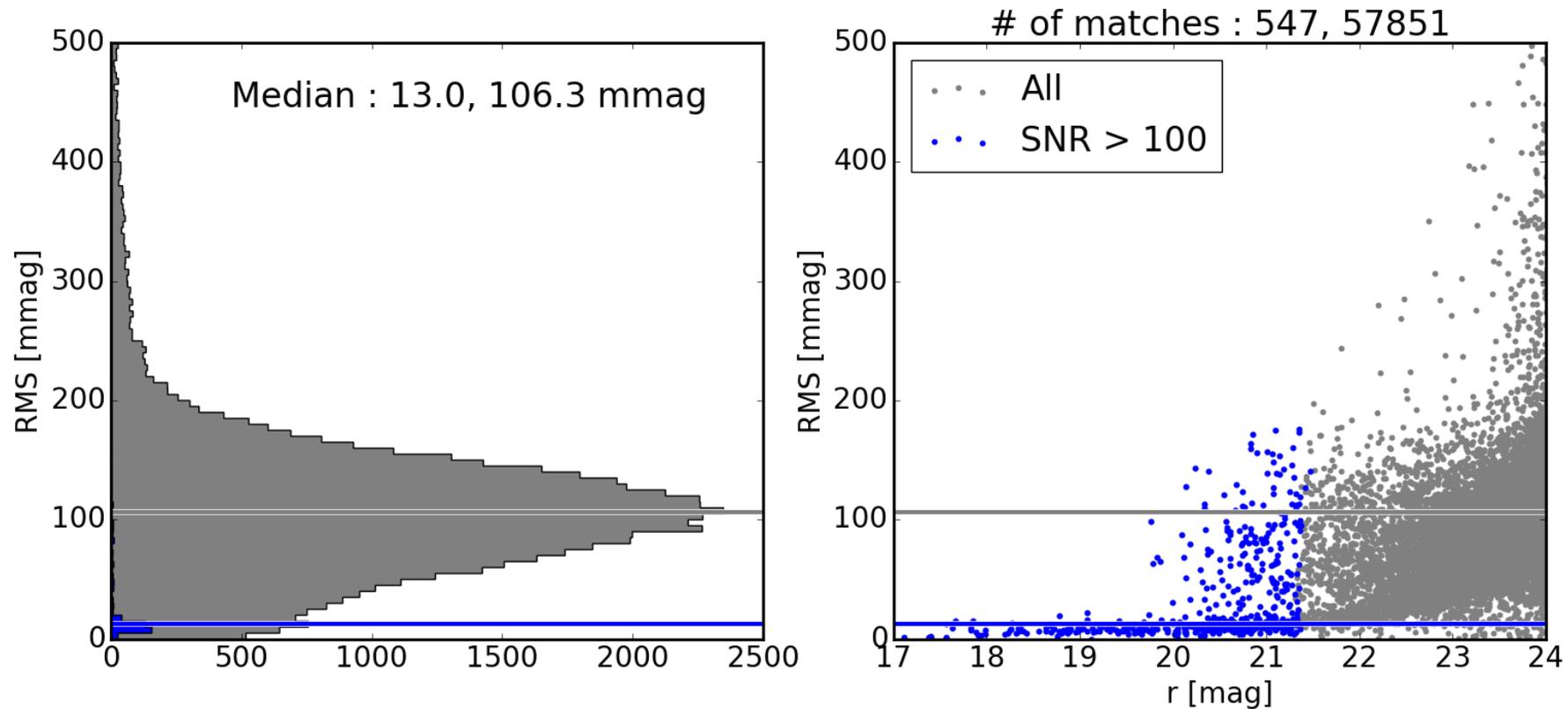
- Output:

Measured	Required	Passes
PA1 : 10.86 mmag	< 5.00 mmag	== False
PF1 : 8.77 %	< 10.00 %	== True
PA2 : 18.15 mmag	< 15.00 mmag	== False
AM1 : 11.39 mas	< 10.00 mas	== False
AF1 : 3.00 %	< 10.00 %	== True
AM2 : 11.42 mas	< 10.00 mas	== False
AF2 : 3.32 %	< 10.00 %	== True

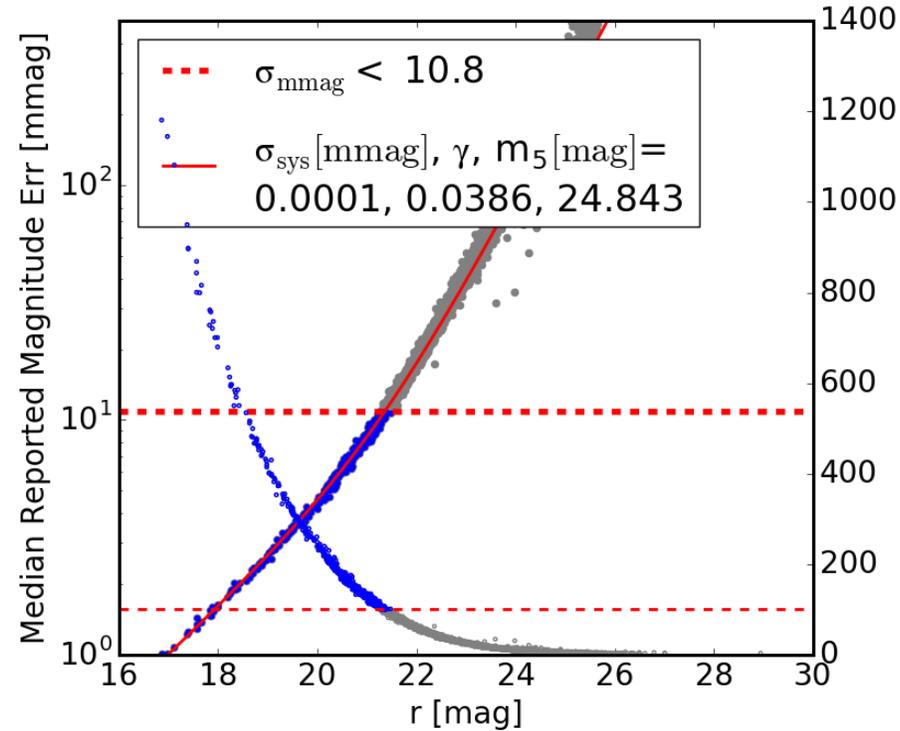
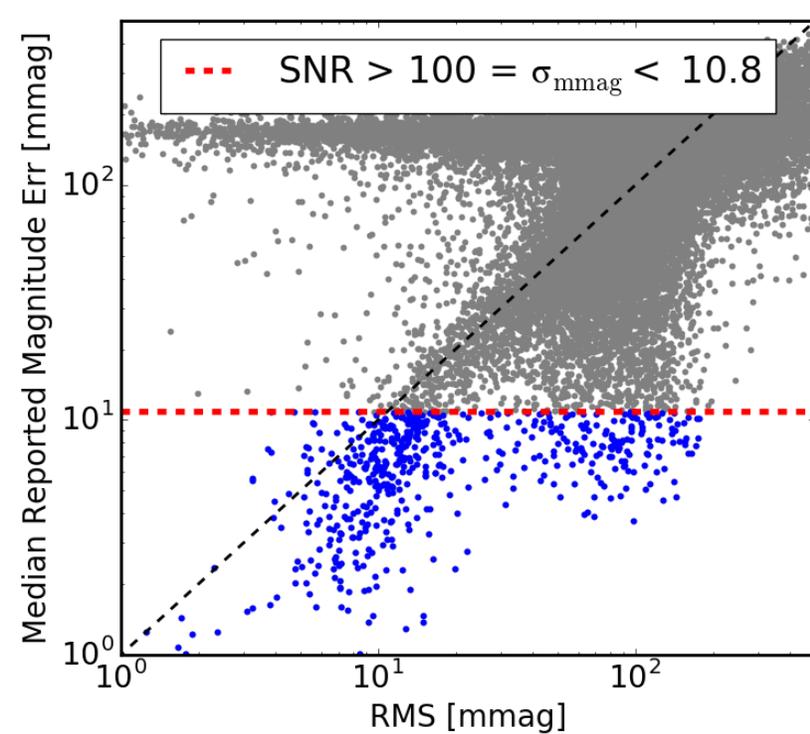


Photometry plots (plotPhotometry)

Photometry Check : sps_lsst_data_CFHT_D3_output_r



Photometry plots (plotPhotometry)



Expected Photometric errors :

$$\sigma^2 = \sigma_{\text{sys}}^2 + \sigma_{\text{rand}}^2$$

$$\sigma_{\text{rand}}^2 = (0.04 - \gamma) x + \gamma x^2$$

with $x \equiv 10^{0.4(m-m_5)}$

m : magnitude

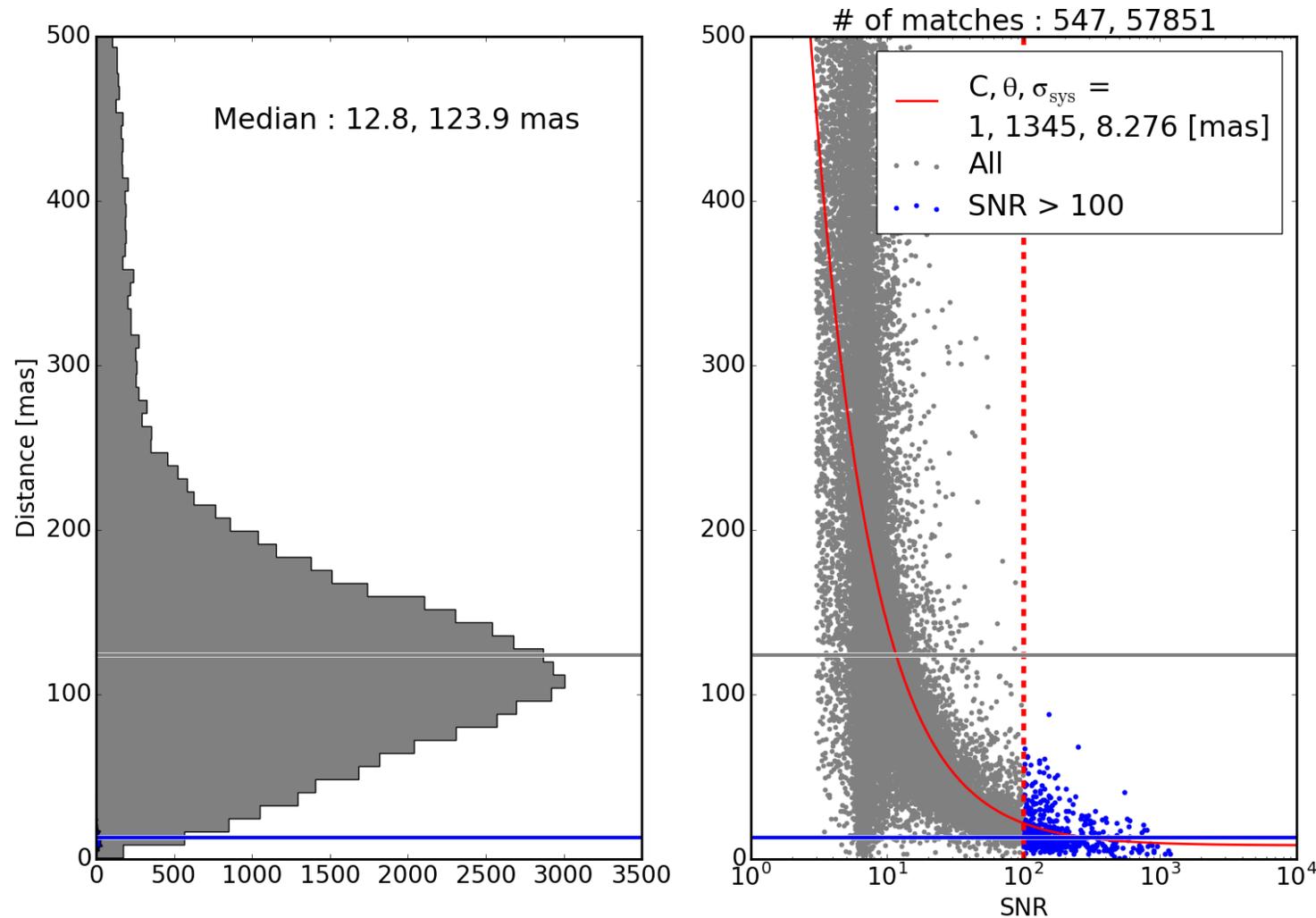
σ_{sys} : Limiting systematics floor

γ : proxy for sky brightness and readout noise

m_5 : 5-sigma depth ⁸

Astrometry plots (plotAstrometry)

Astrometry Check : sps_lsst_data_CFHT_D3_output_r



Expected astrometric uncertainty:

$$\sigma = \frac{C\theta}{SNR} + \sigma_{sys}$$

C : scaling factor

θ : seeing

σ_{sys} : systematic error floor

Short term Goals :

- Estimate the quality of the stack (control plots)
 - Use of the package `validate_drp` and add new functions (if necessary)
 - Compare Calexps with/without Simultaneous Astrometry
 - Adapt the code to evaluate Coaddition

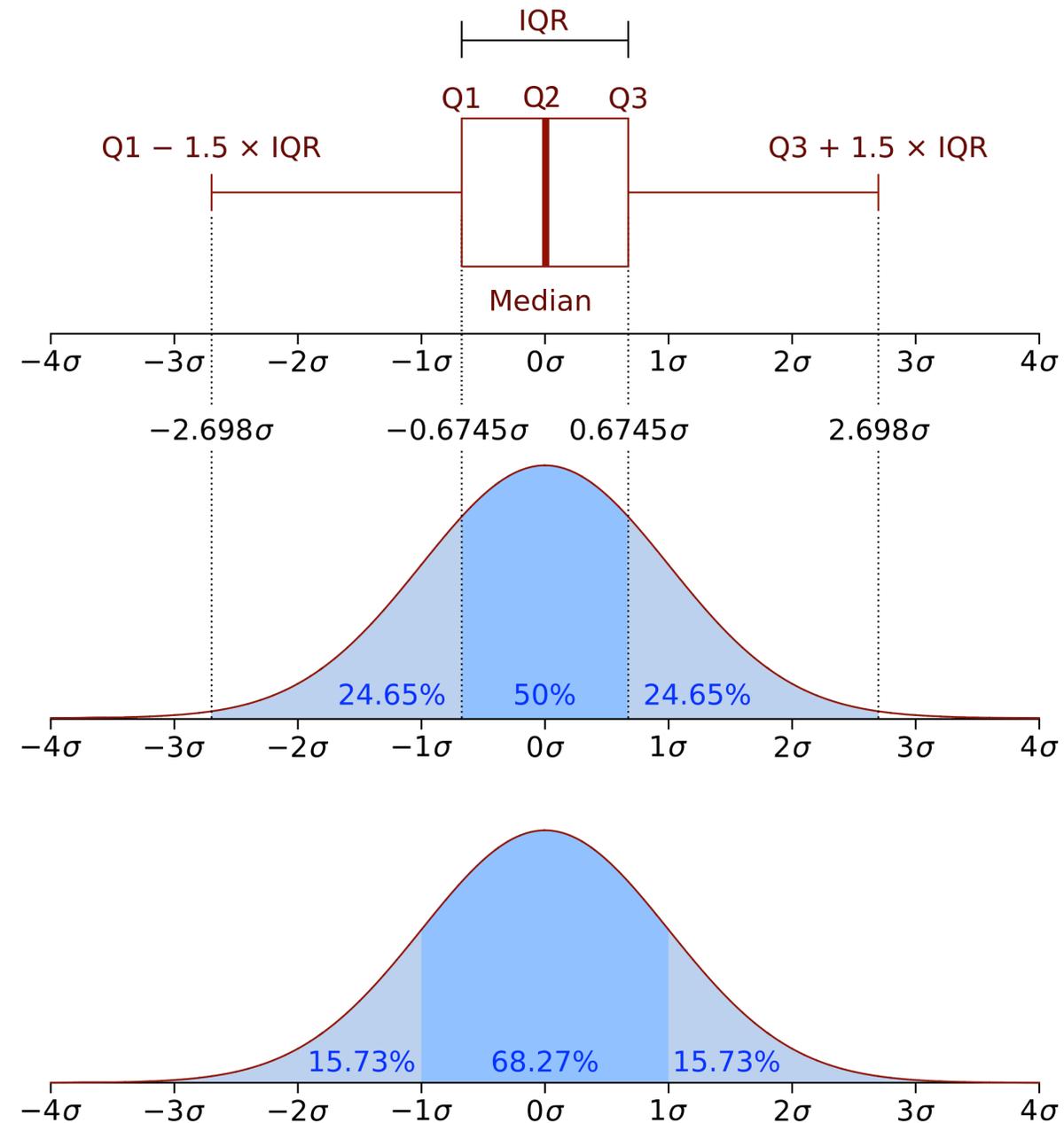


Thanks for watching

Interquartile range (IQR)

- measure of variability
- dividing a data set into four equal parts

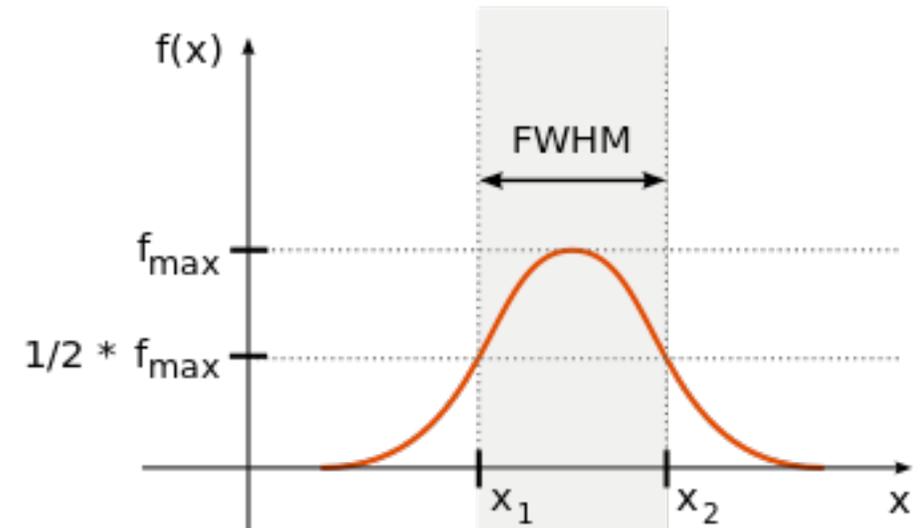
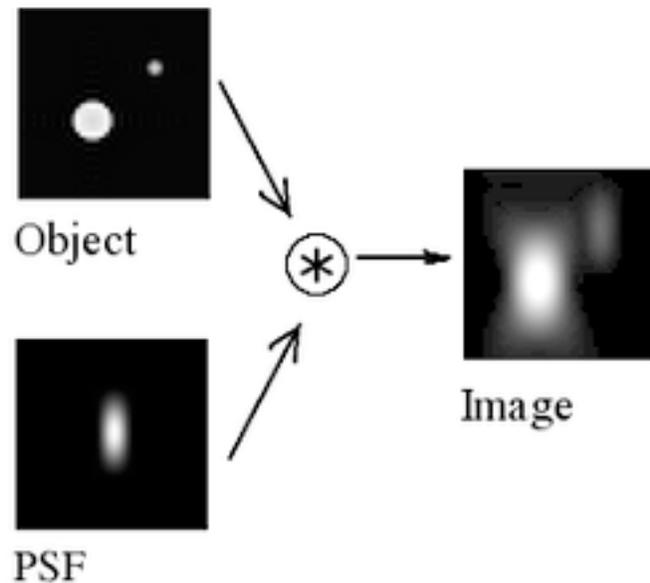
$$\text{IQR} = Q_3 - Q_1$$



Example for a Normal distribution

Astronomical seeing

- full width at half maximum (FWHM) of the point spread function (PSF)



For a normal distribution :

$$\text{FWHM} = 2\sqrt{2 \ln 2} \sigma \approx 2.355 \sigma$$