Noise in the CoRoTExo-fieldlightcurves

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Instrumental specification

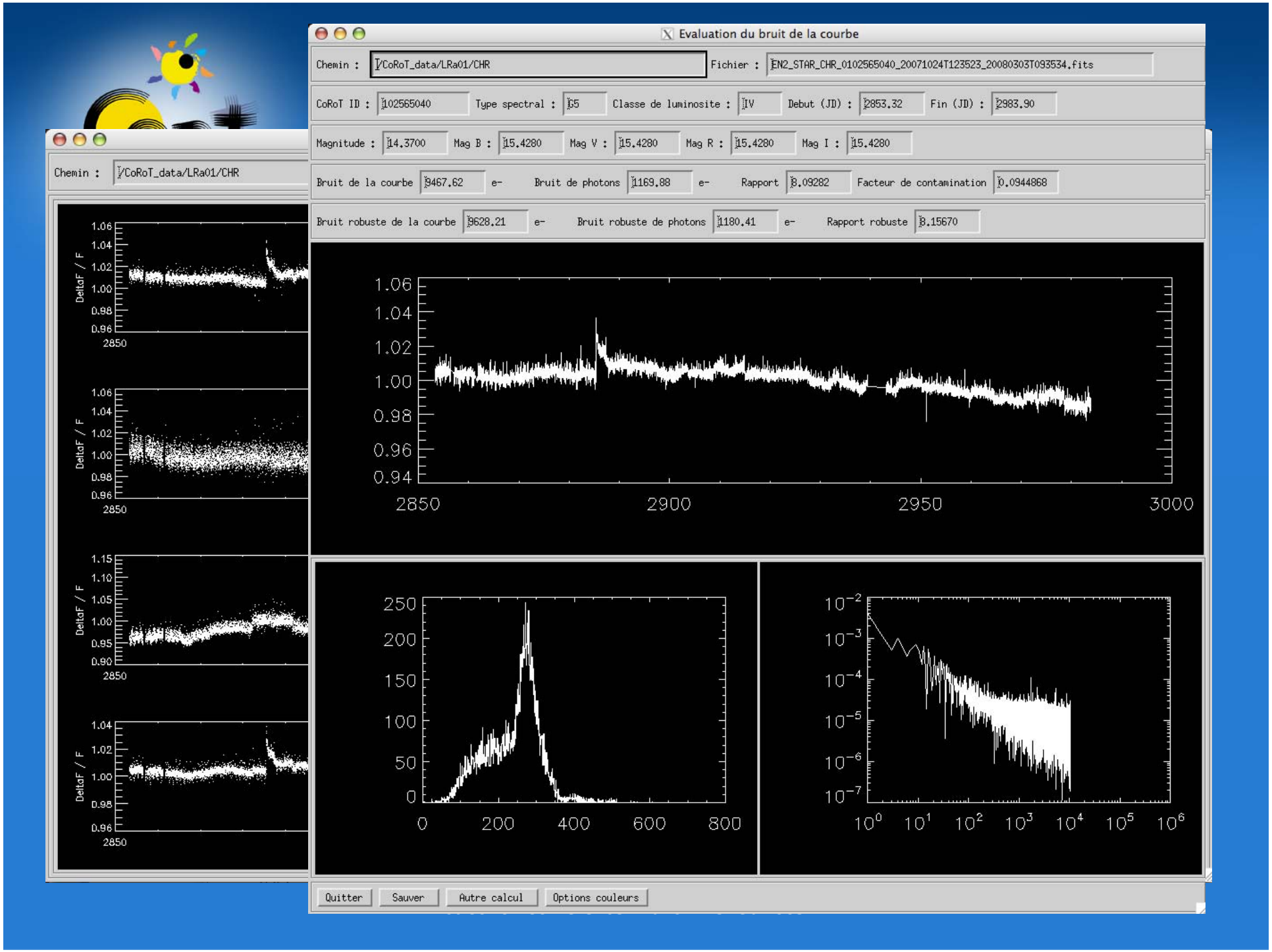
-Instrumental noise should not behigherthan 1.5 x photon noise for a K0 star of mv=14, over 1 hour (noise < 7 x 10^{-4} over 1h)

-Expected sources of noise

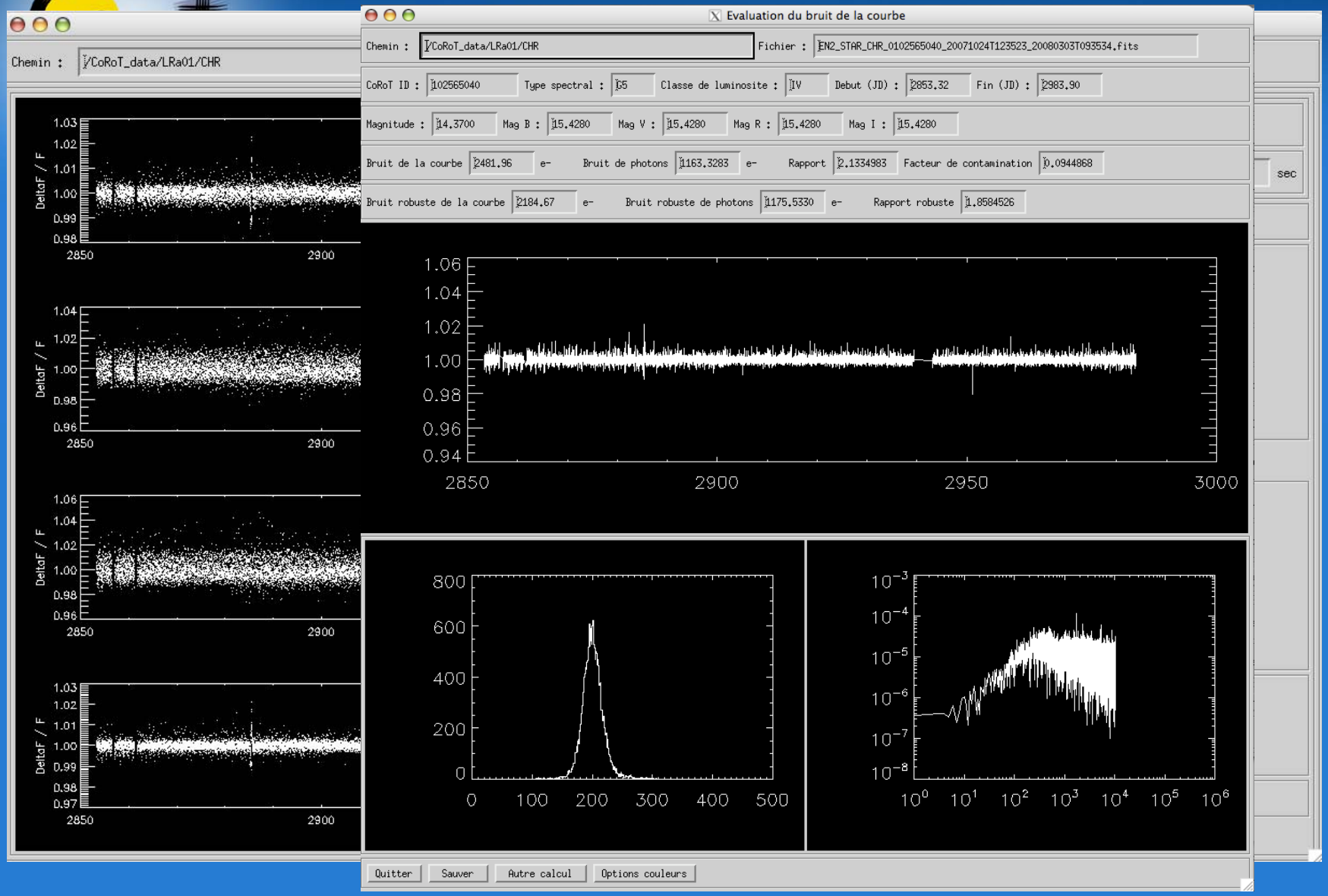
- photon noise
- background noise
- CCD readout noise
- Darkcurrent
- hot pixels effects
- Orbital effects (SAA, eclipses…)
- Pointingeffects (jitter noise)
- …

Evaluation of lightcurve noise

- Use of LRa01 data set,
- Use of 512 s sampledchromaticlightcurves
-Selection of status=0 data
- White light (red + green + blue)
-High frequencyfiltering (slidingmean over 70 points (10 hours)
-Selection of « calm » stars using an histogram of deviations and FFT of the light curve : 700 curvesselected
- Estimation of noise by rms and absolutedeviation to median
-Sameprocess on a pure white signal with the samefiltering
-Statisticalanalysis of the results

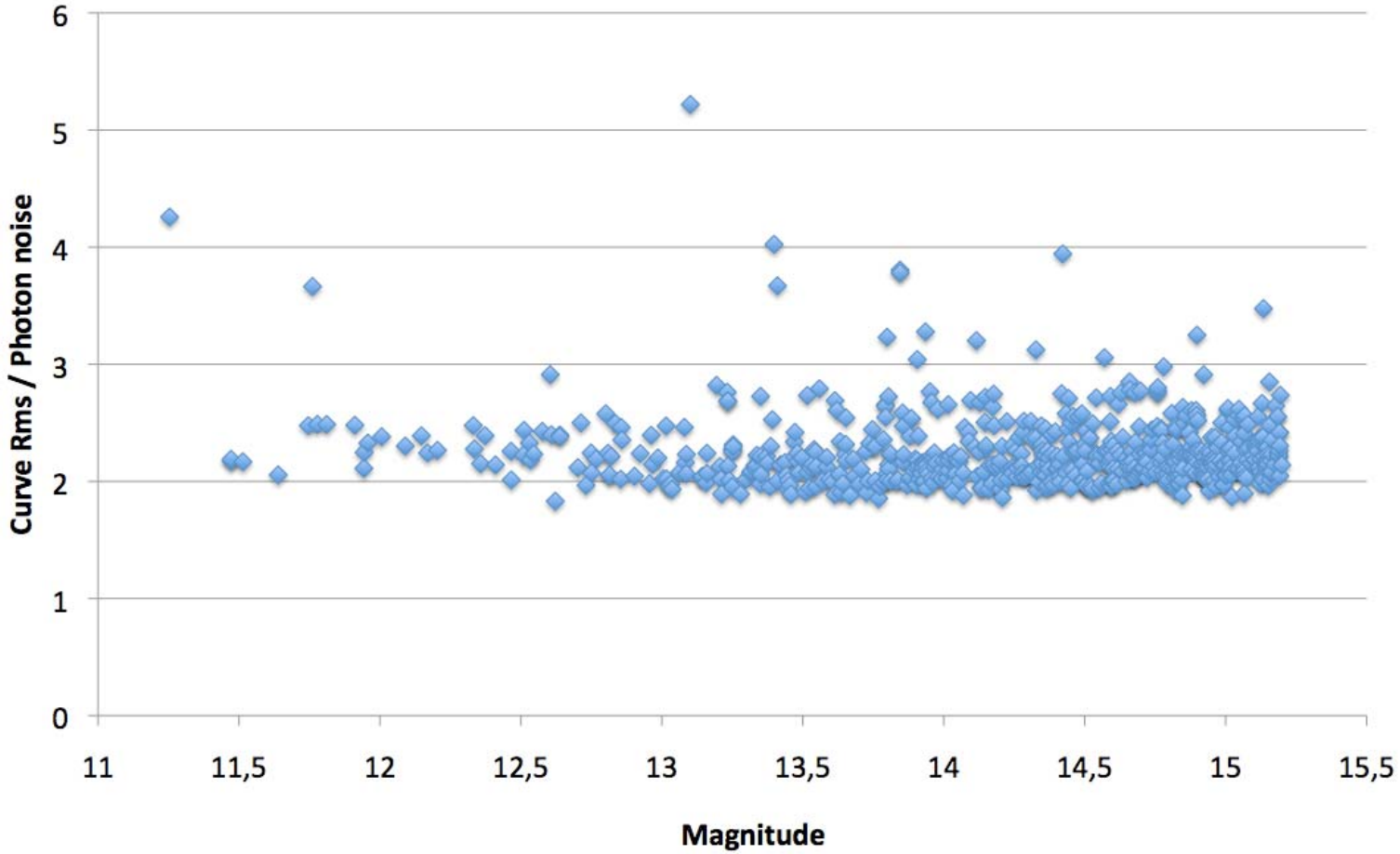

Evaluation du bruit de la courbe
Chemin : /CoRoT_data/LRa01/CHR
Fichier : EN2_STAR_CHR_0102565040_20071024T123523_20080303T093534.fits
CoRoT ID : 102565040
Type spectral : G5
Classe de luminosite : IV
Debut (JD) : 2853.32
Fin (JD) : 2983.90
Magnitude : 14.3700
Mag B : 15.4280
Mag V : 15.4280
Mag R : 15.4280
Mag I : 15.4280
Bruit de la courbe 9467.62 e-
Bruit de photons 1169.88 e-
Rapport 8.09282
Facteur de contamination 0.0944868
Bruit robuste de la courbe 9628.21 e-
Bruit robuste de photons 1180.41 e-
Rapport robuste 8.15670
Quitter
Sauver
Autre calcul
Options couleurs
DeltaF / F

Estimation of lightcurve noise (2)



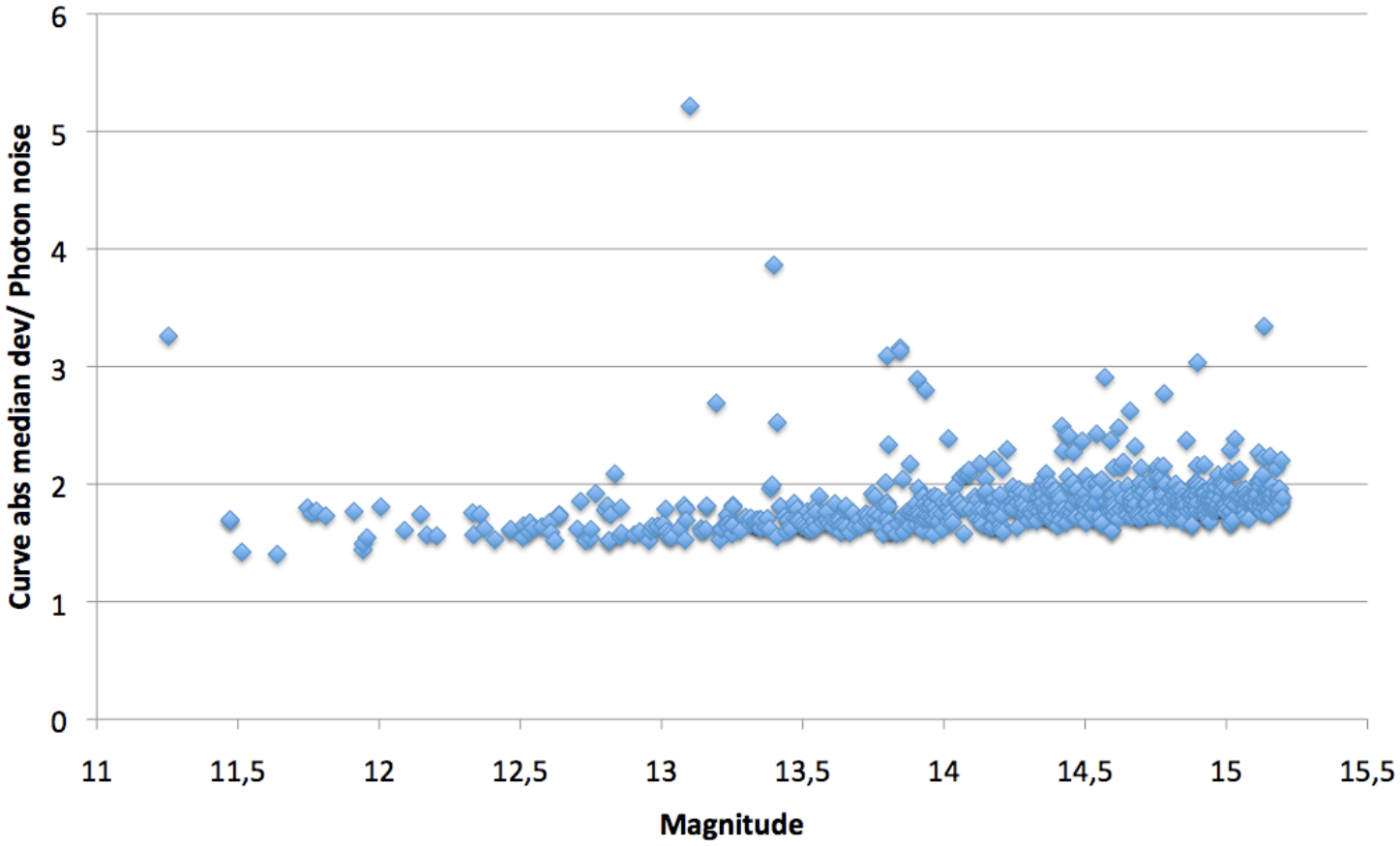
512 s sampling

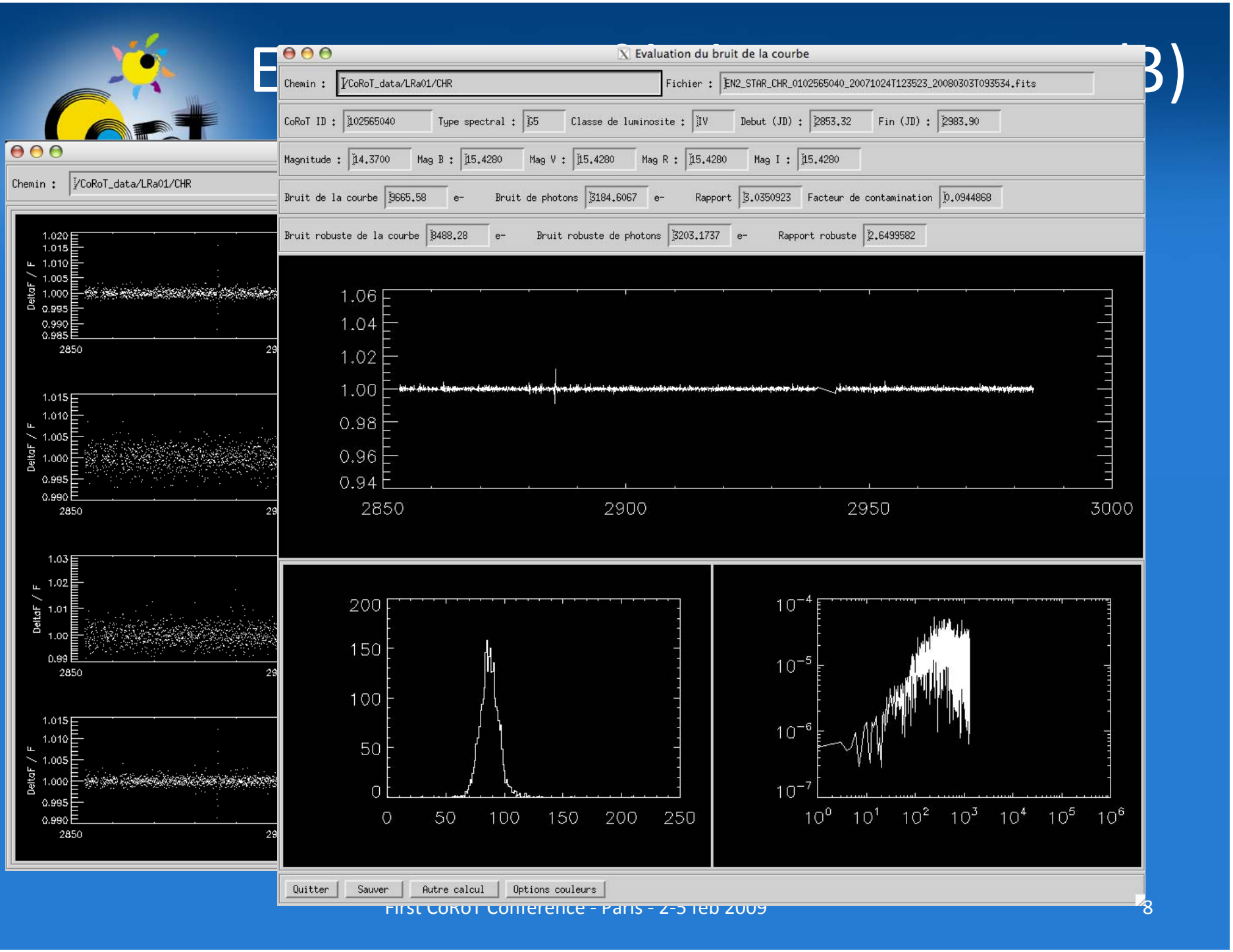
	mean	rms	median
11-12	2,547648462	0,656548329	2,32702
12-13	2,263299773	0,194896202	2,24246
13-14	2,250830455	0,418415865	2,139395
14-15	2,233472922	0,256704265	2,168965
15-16	2,270288587	0,235871429	2,22668



512 s sampling

	mean	rms	median
11-12	1,750849231	0,476043047	1,69651
12-13	1,652058409	0,121656653	1,61611
13-14	1,770477	0,366165105	1,69584
14-15	1,88376247	0,191014626	1,845205
15-16	1,925879022	0,20016727	1,889905

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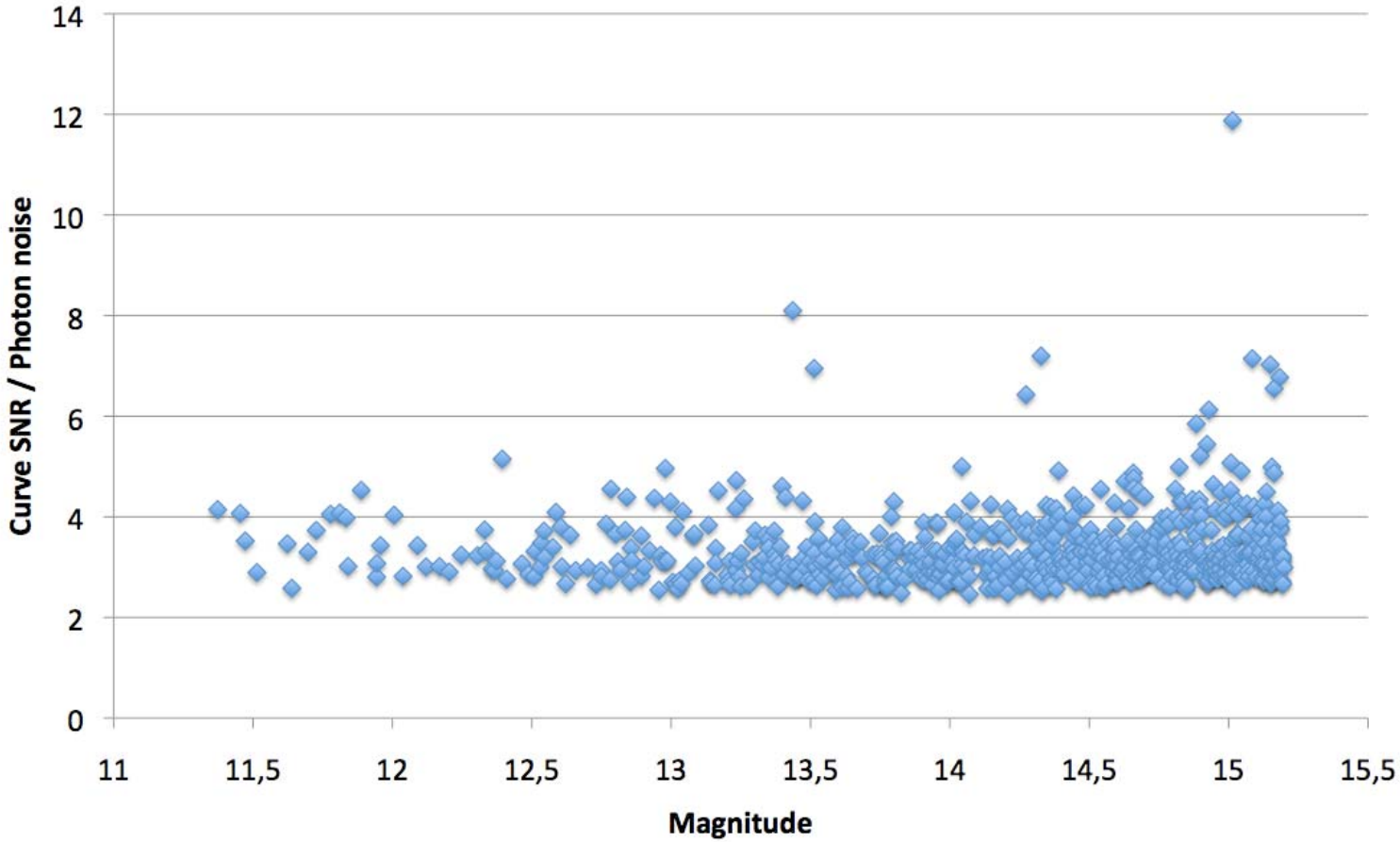
Mag V : 15.4280
Mag R : 15.4280
Mag I : 15.4280
Bruit de la courbe 3665.58 e-
Bruit de photons 3184.6067 e-
Rapport 3.0350923
Facteur de contamination 0.0944868
Bruit robuste de la courbe 3488.28 e-
Bruit robuste de photons 3203.1737 e-
Rapport robuste 2.6499582
Quitter
Sauver
Autre calcul
Options couleurs
DeltaF / F

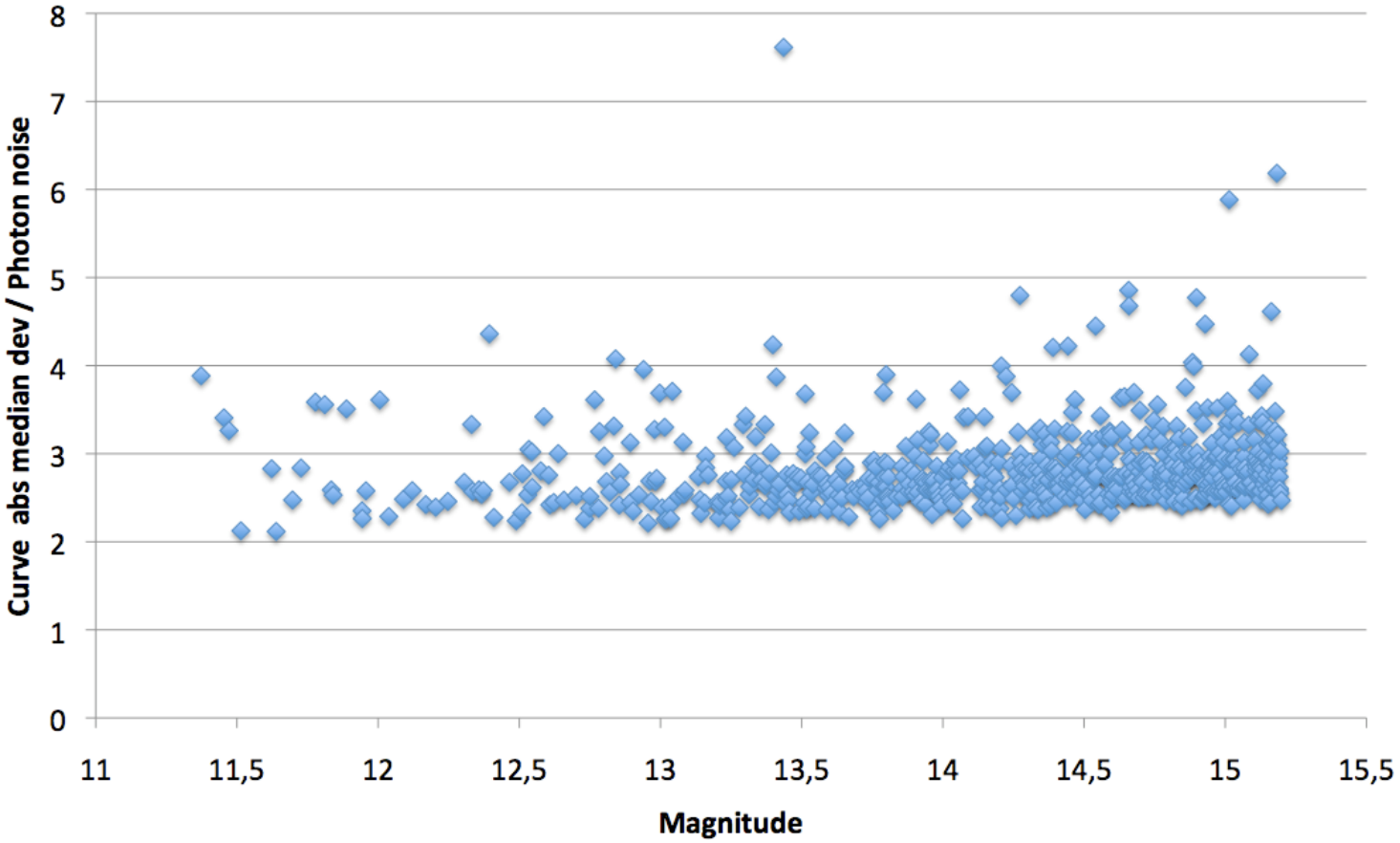
512 s sampling + x8 binning

	mean	rms	median
11-12	3,541121875	0,568725864	3,492395
12-13	3,328627719	0,578798513	3,13503
13-14	3,182688391	0,651941799	3,048665
14-15	3,324910723	0,645205888	3,155835
15-16	3,599787059	1,211038427	3,251115



512 s sampling + x8 binning

	mean	rms	median
11-12	2,8687	0,580969292	2,70869
12-13	2,775972632	0,489878542	2,59008
13-14	2,732406494	0,502957275	2,64062
14-15	2,858572229	0,41376833	2,76975
15-16	2,966310098	0,56916178	2,83773

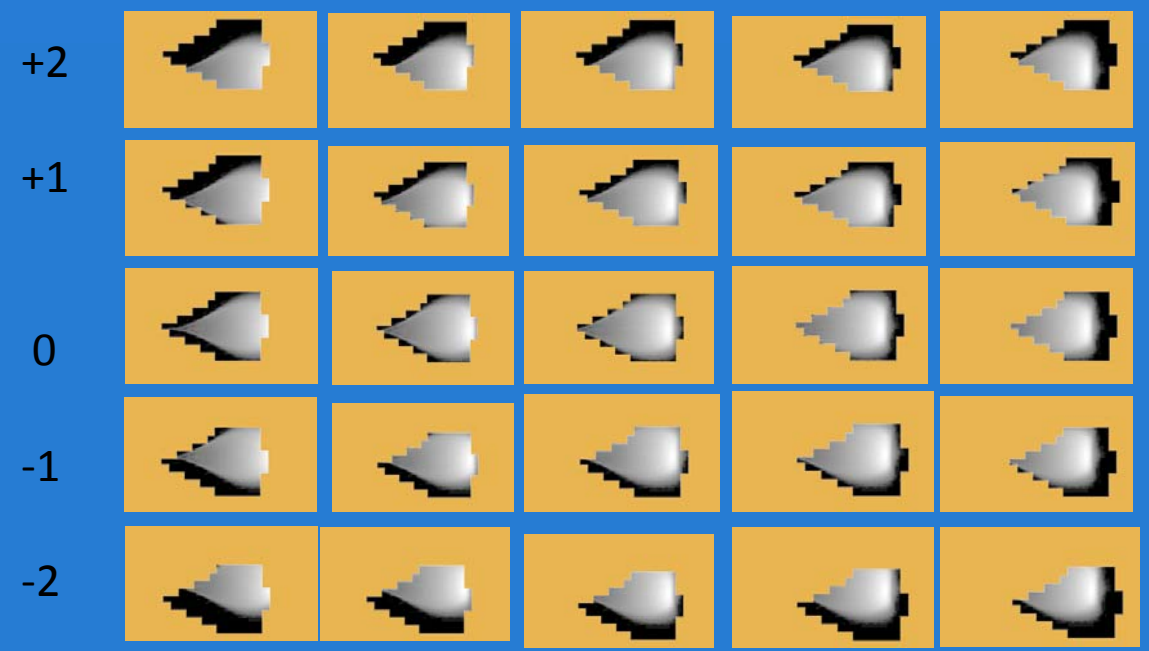


Jittereffects

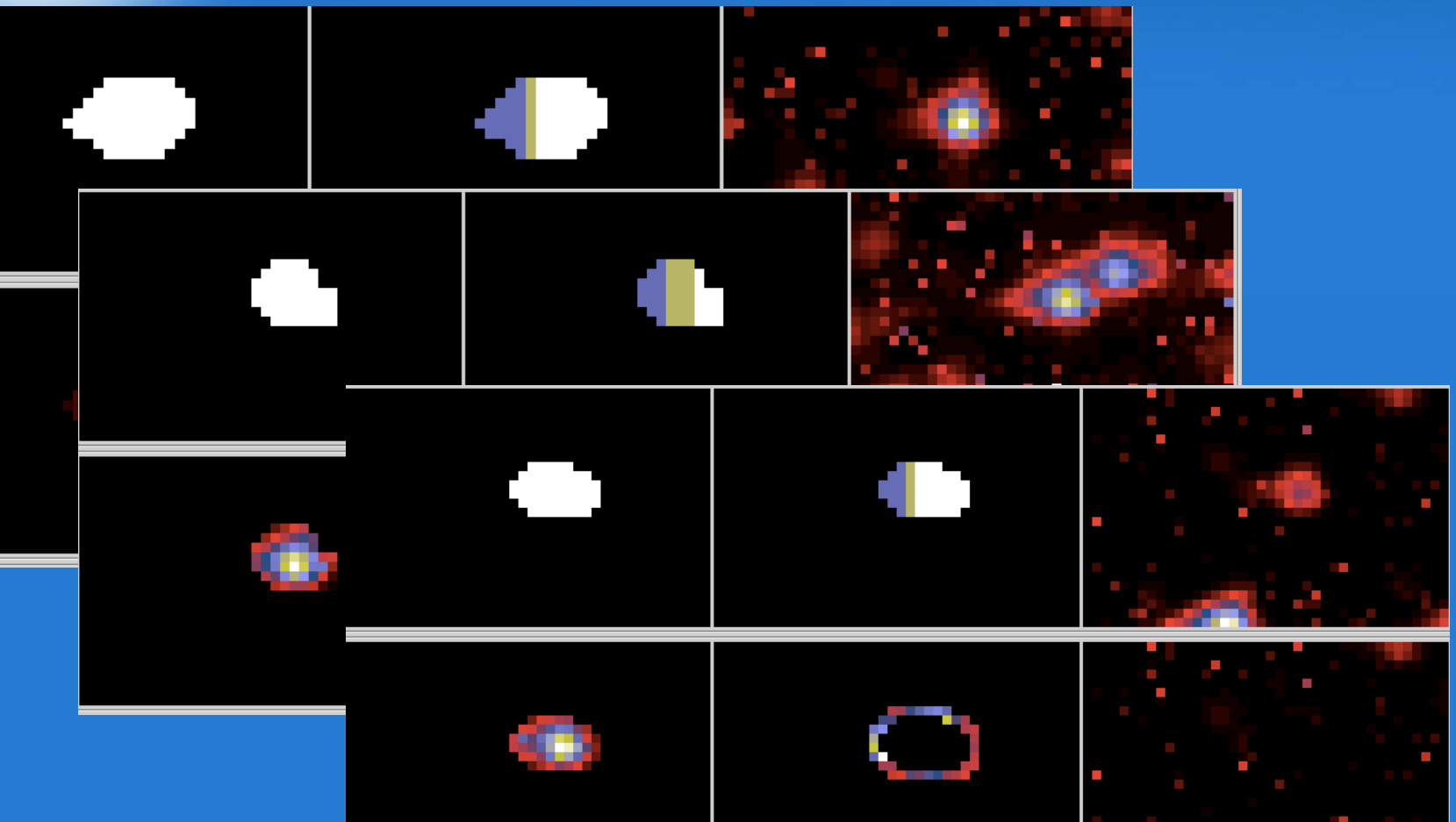
fect of colorfrontiers

fects of maskedges : (See F. Fialho's talk)

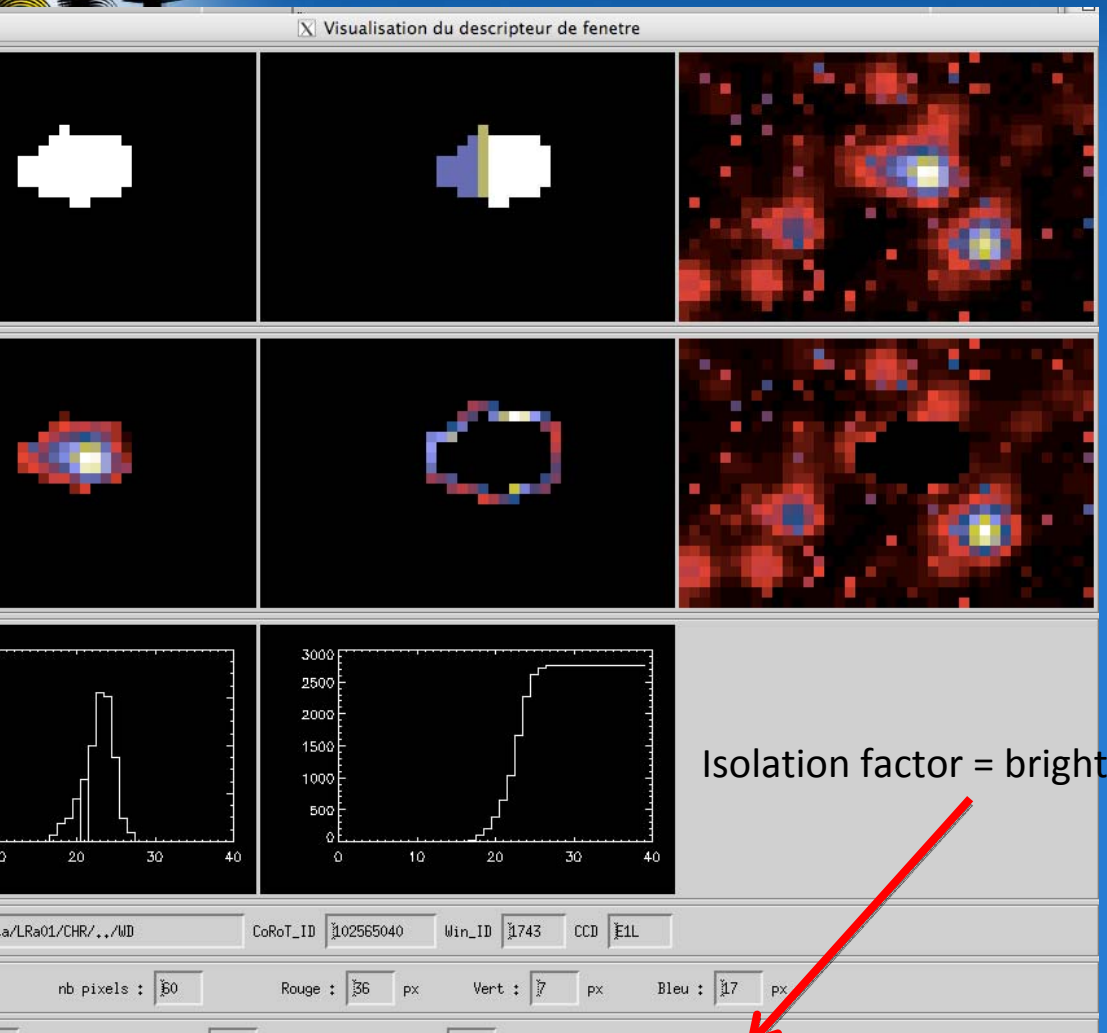
dépends on target AND environment (contamination + hot els)



Jittereffect and maskshape (2)

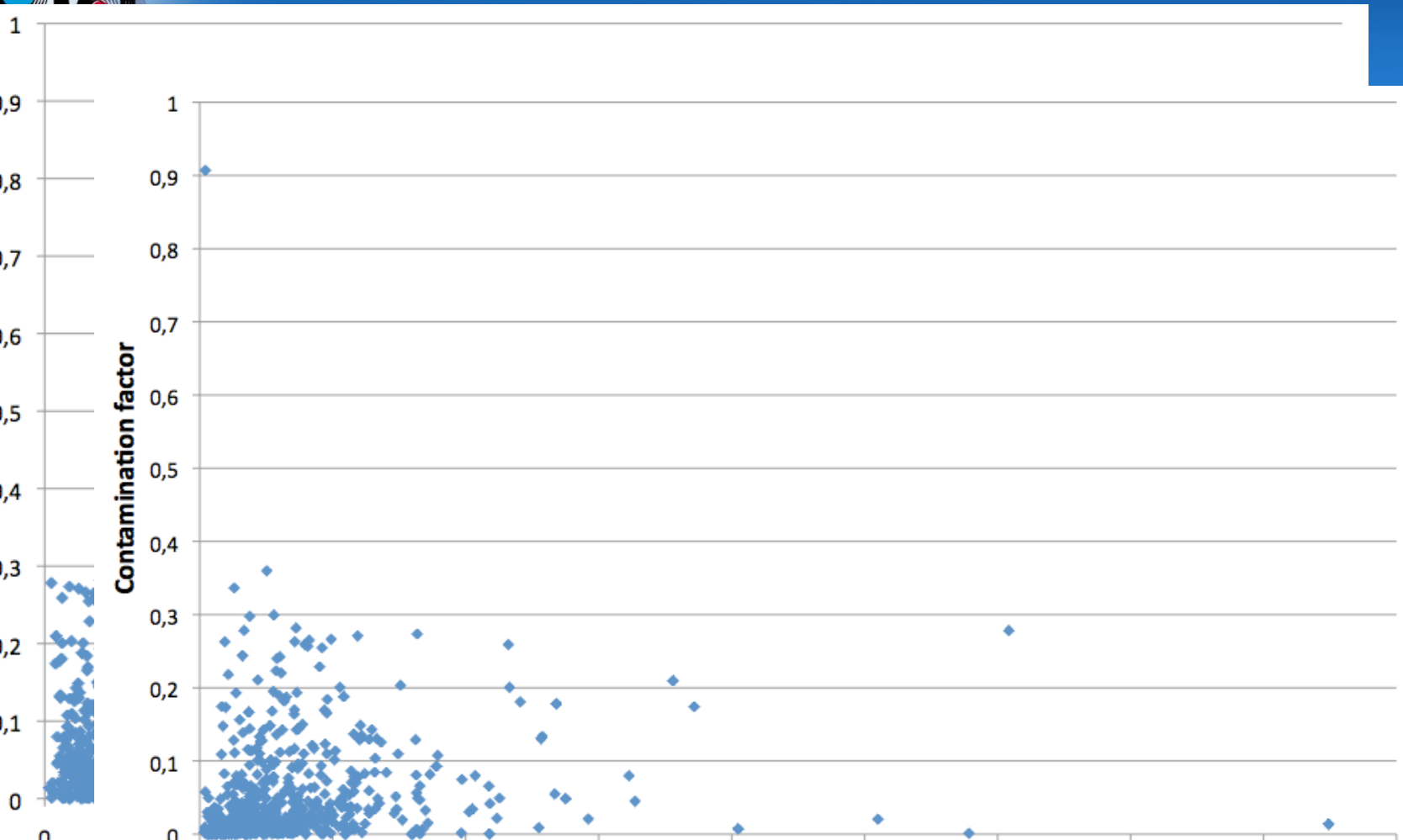


The isolation factor

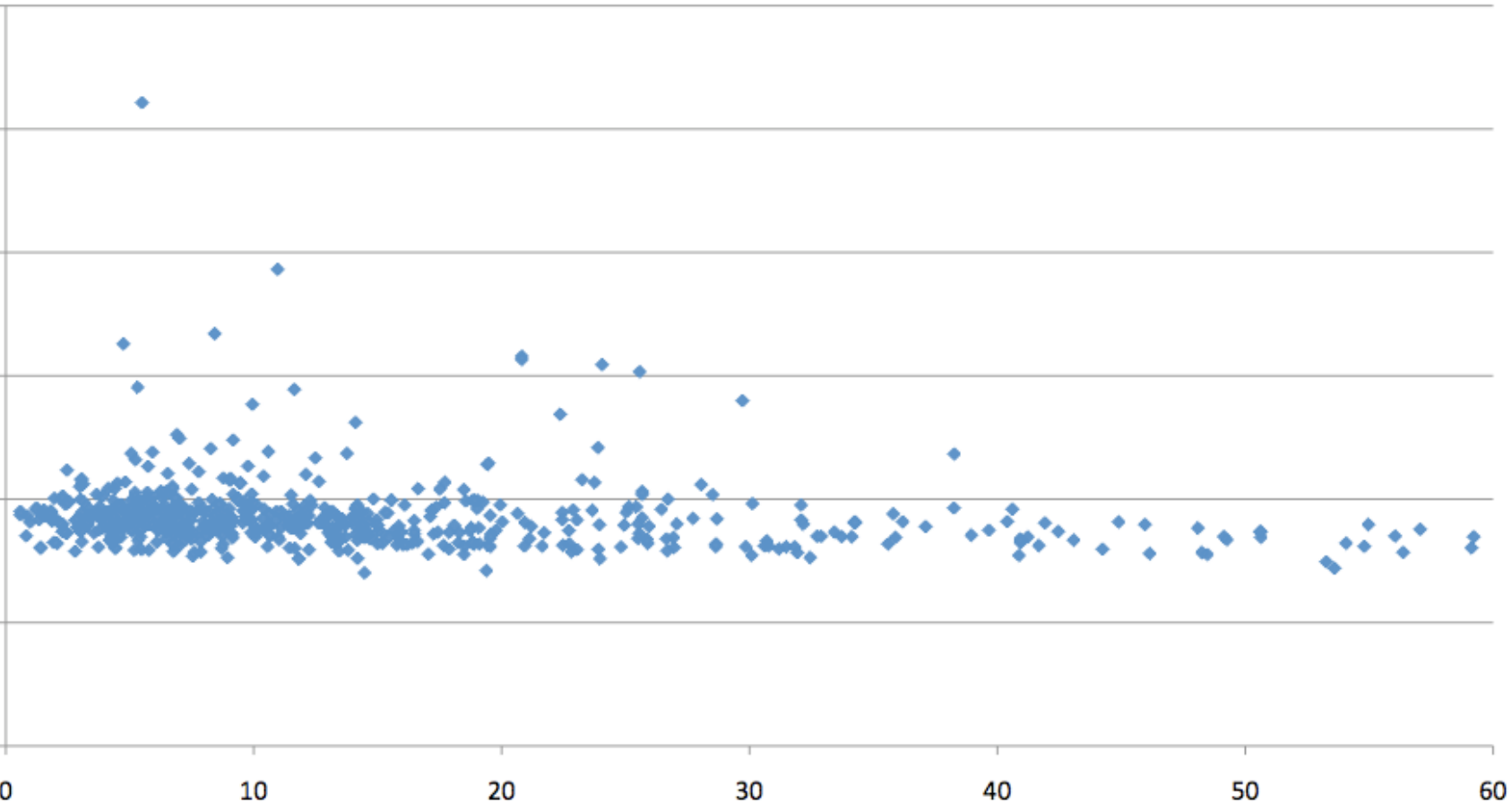


Isolation factor = brightestmask pixel / brightest ring pixel

Isolation / contamination



SNR / isolation



Conclusion

The meanlevel of noise isslightlyhigherthanspecified
The level of noise is not verydependant on targets magnitude
t the first order)
The noise is not white, binningisless efficient
The level of noise is not systematicallycorrelatedwith the
ontamination level
ittereffectiscertainly a systematiceffect but with no
ystematicconsequence on the stability
Evaluation shouldbedonewith data from the new pipeline
t isvaluable to spend time on data quality estimation