



# **PACS Spectrometer simulated flux modulation by pointing jitter draft v0.1**

**Roland Vavrek (HSC)**

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# Simulation v0.1

- Only spaxel[2,2]
- Instead of using the beam profile for spaxel[2,2], a narrower Gaussian (FWHM=8.2") is used to simulate the beam convolved with the spaxel (@ 84.5 micron)
- The jitter excursion is assumed to be well represented by the Ra/Dec residuals in the PacsCube (L1) product
- Any uncertainties in the chopper position to sky angle calibration are ignored
- The 2D Gaussian flux model is evaluated for every frame at the jitter position, the peak flux at the peak is 1.0



# The observation

## Observation summary

OBSID: 1342230902

AOR Label: PSpecR-Range [164-174]+[82-87] - HD44179

Proposal: OT1\_cjoblin\_2

Target: HD 44179

Observing Day (OD): 881

Observing started: Wed Oct 12 07:29:47 CEST 2011

Total duration (incl. slew): 2944.0 seconds

AOT: PacsRangeSpec

Observing mode: Pointed, Chop/Nod

Chopper throw: small

Nod cycles: 1

Sampling: High density mode

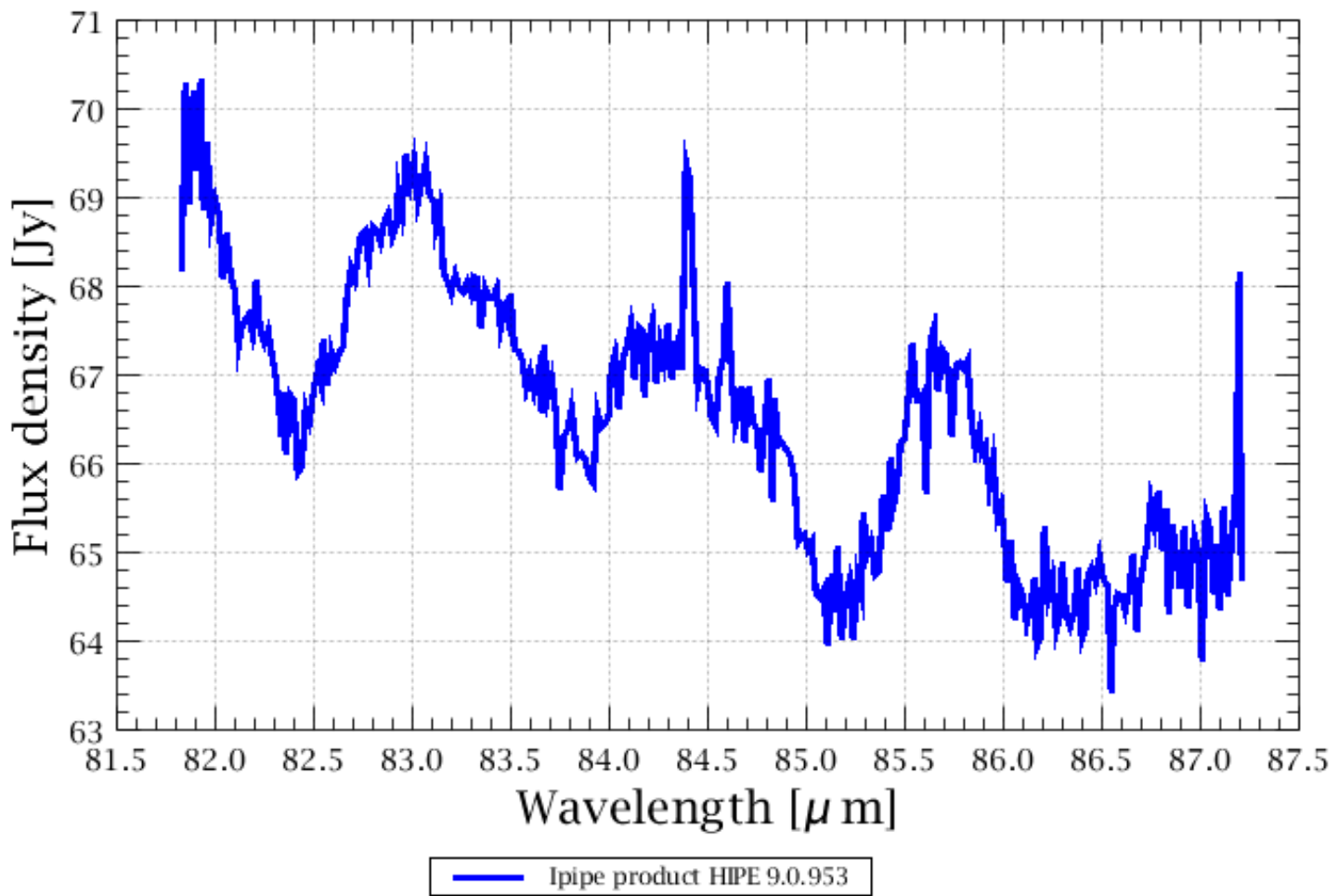
## Observation block summary

Number of requested primary lines/ranges: 1

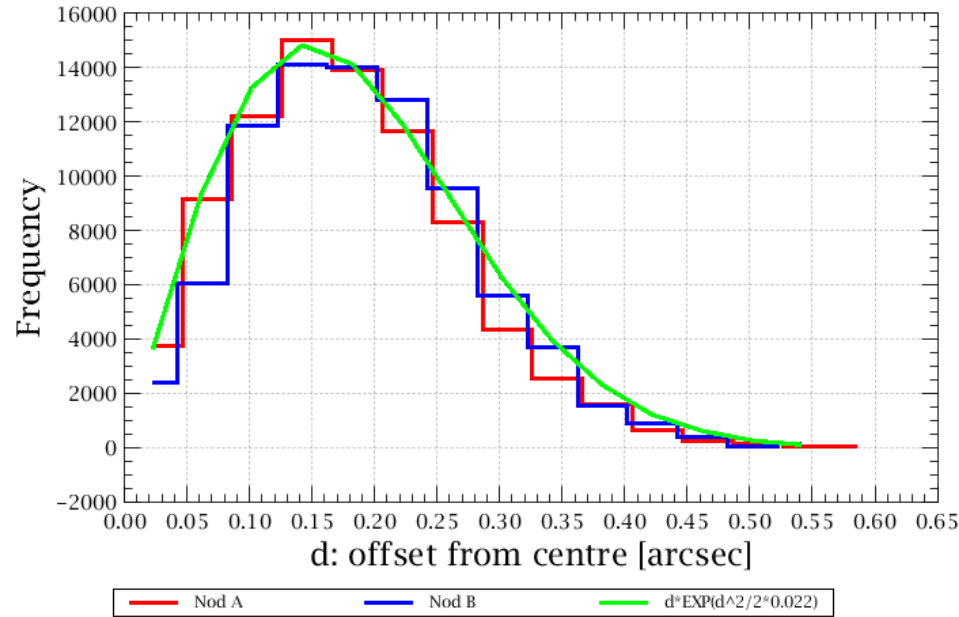
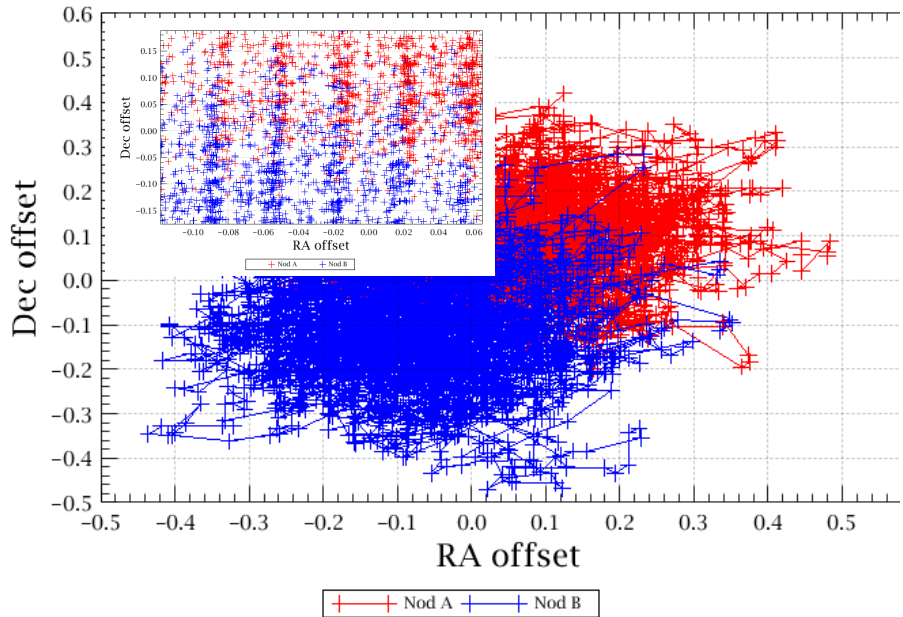
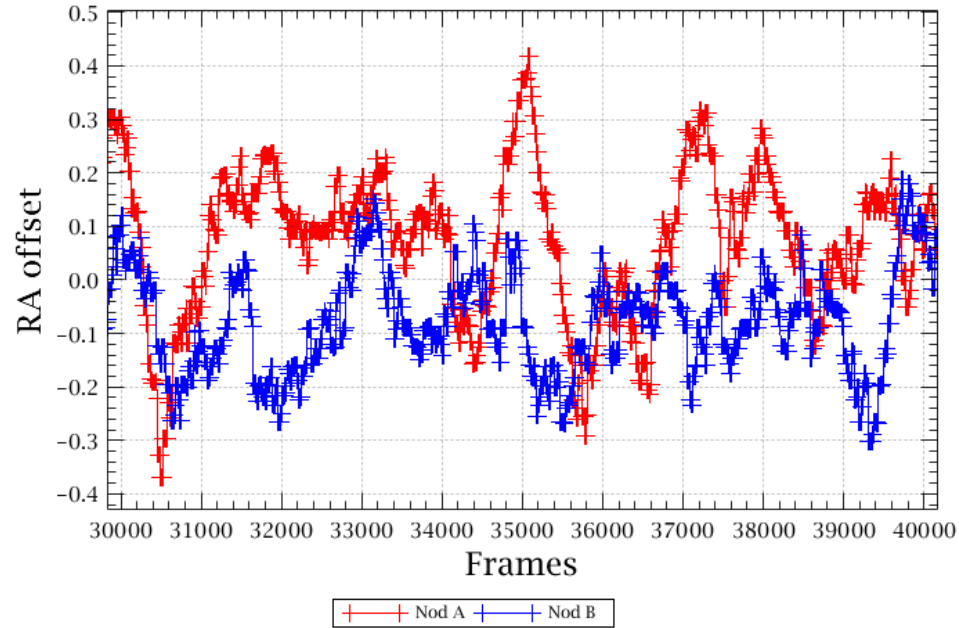
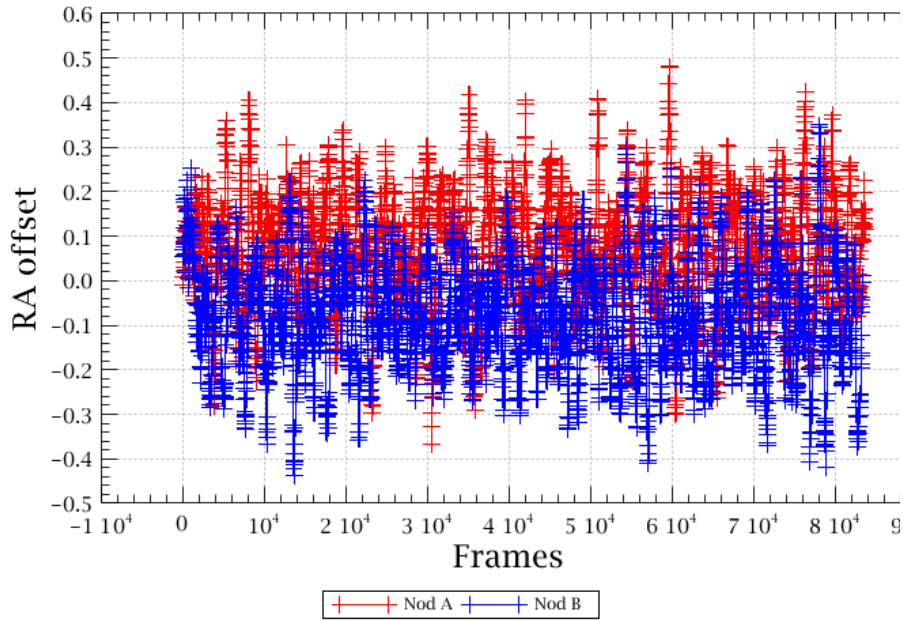
List of requested primary ranges [microns]:

Line/range 1 : 164.0 - 174.0 microns, 1 repetitions, ID Range 1

# The observation

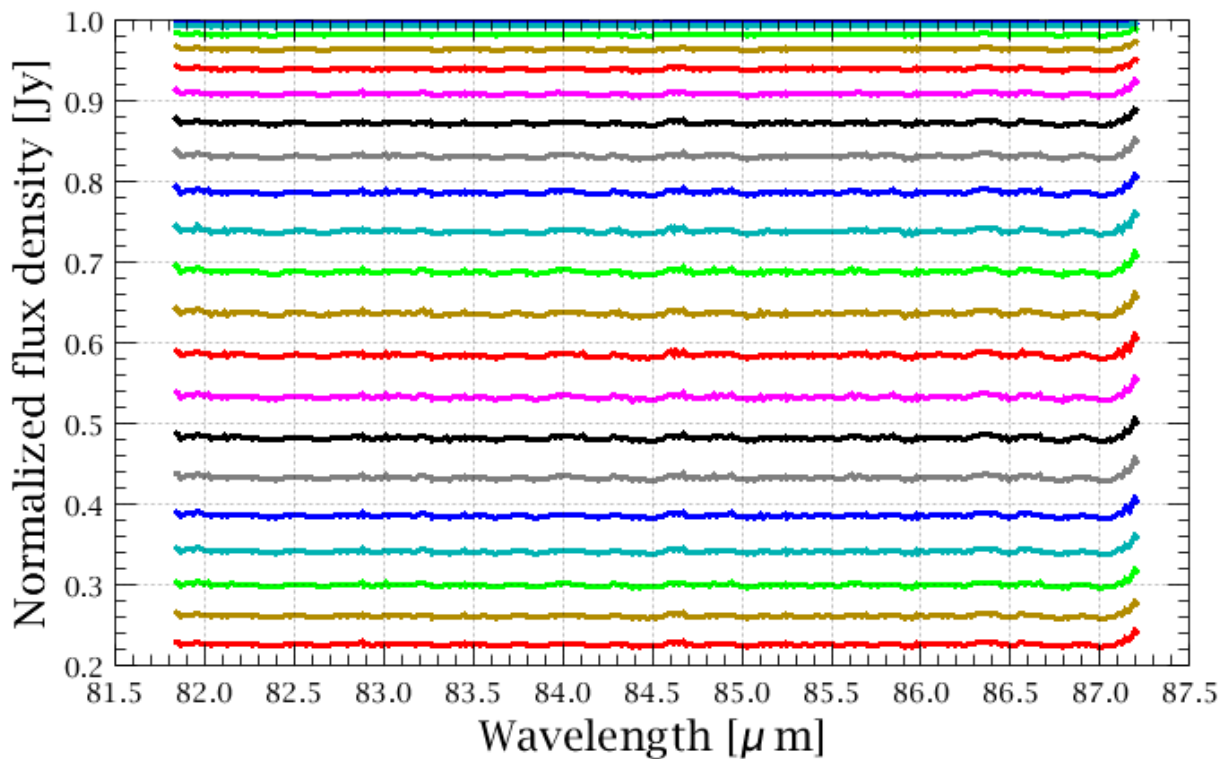


# The observation – pointing jitter from PP



# Simulated spectra

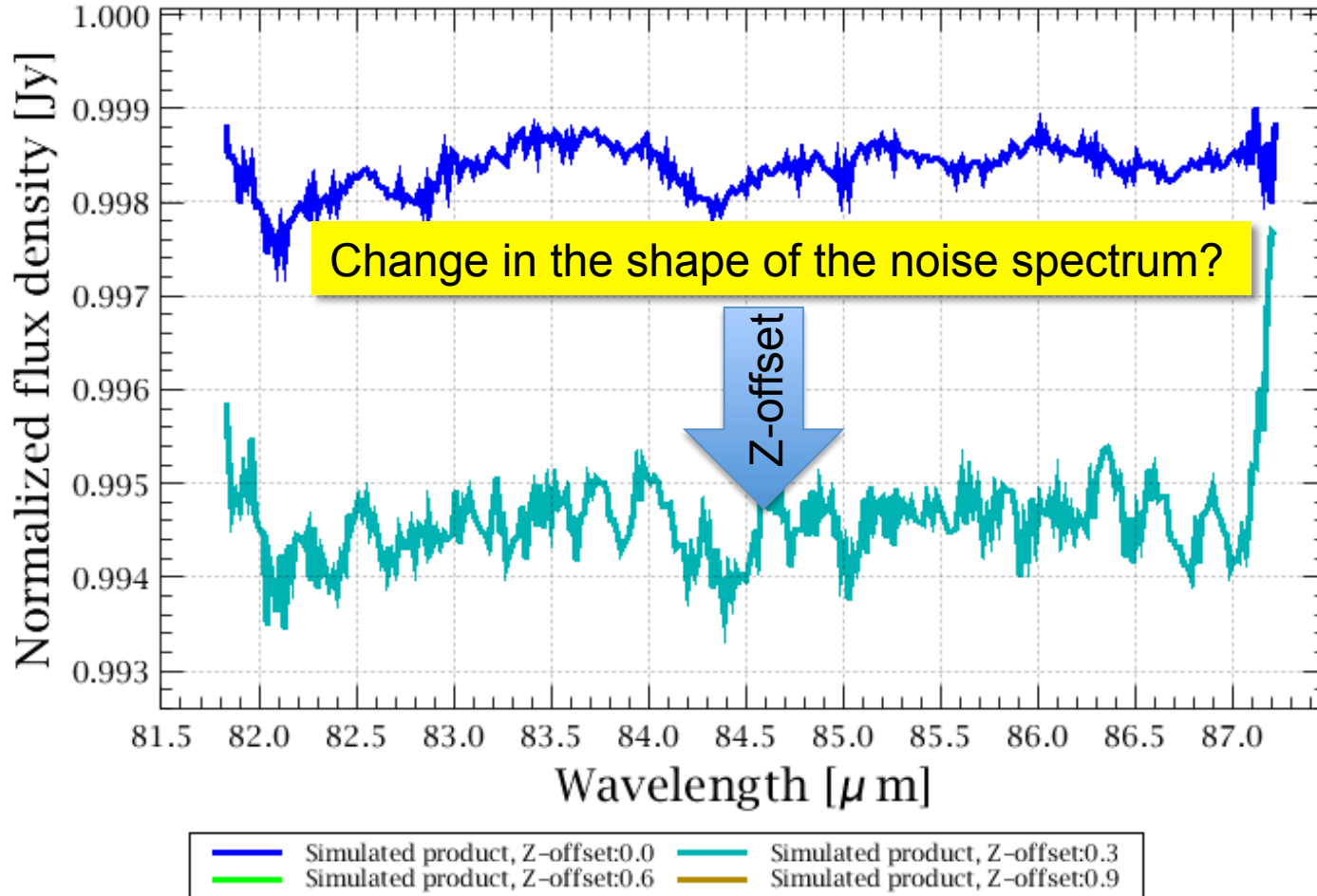
Y-offset=0.0, Z-offset = [0.0...6.0] (arcsec)



- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| — Simulated product, Z-offset:0.0 | — Simulated product, Z-offset:0.3 |
| — Simulated product, Z-offset:0.6 | — Simulated product, Z-offset:0.9 |
| — Simulated product, Z-offset:1.2 | — Simulated product, Z-offset:1.5 |
| — Simulated product, Z-offset:1.8 | — Simulated product, Z-offset:2.1 |
| — Simulated product, Z-offset:2.4 | — Simulated product, Z-offset:2.7 |
| — Simulated product, Z-offset:3.0 | — Simulated product, Z-offset:3.3 |
| — Simulated product, Z-offset:3.6 | — Simulated product, Z-offset:3.9 |
| — Simulated product, Z-offset:4.2 | — Simulated product, Z-offset:4.5 |
| — Simulated product, Z-offset:4.8 | — Simulated product, Z-offset:5.1 |
| — Simulated product, Z-offset:5.4 | — Simulated product, Z-offset:5.7 |
| — Simulated product, Z-offset:6.0 |                                   |

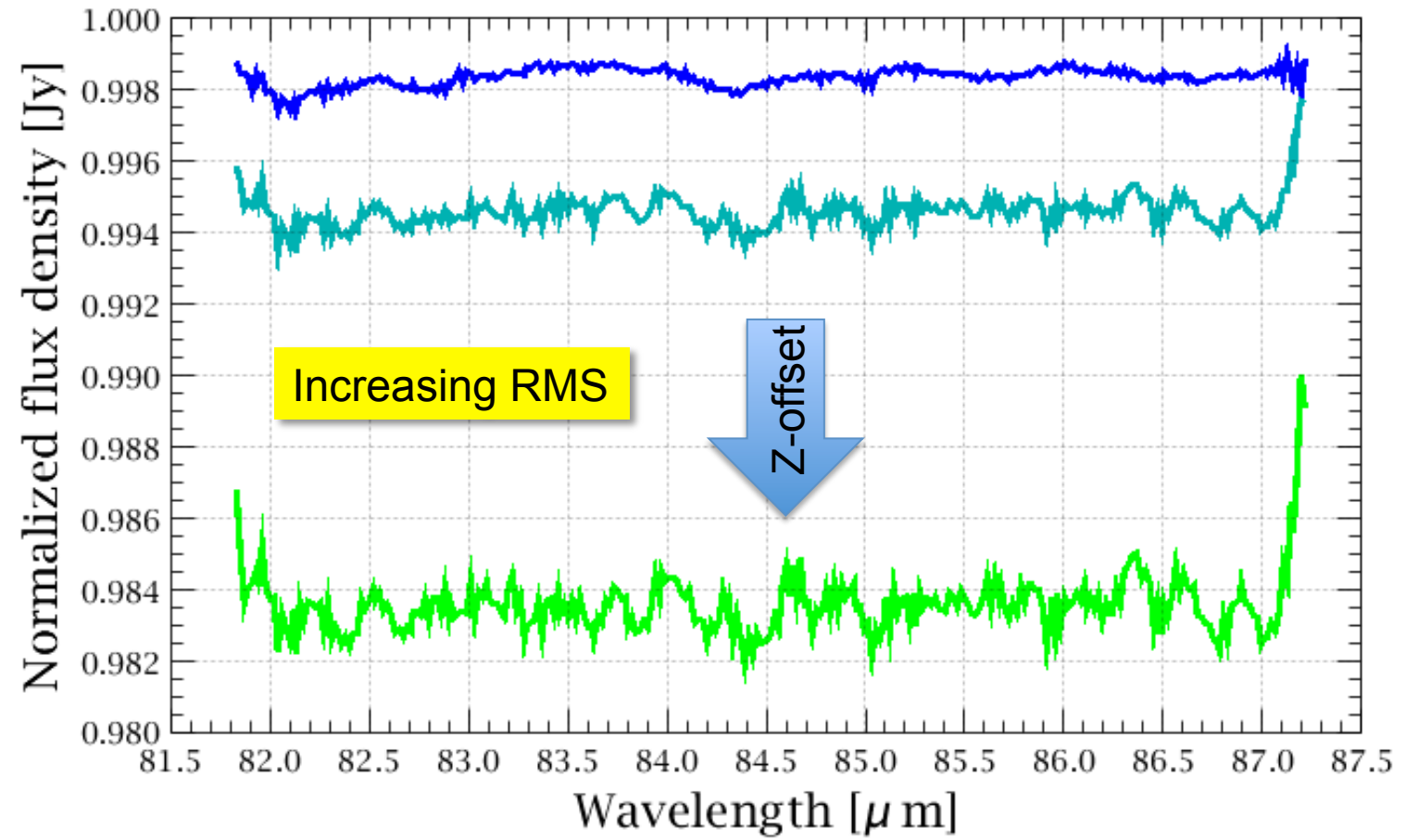
# Simulated spectra

Y-offset=0.0, Z-offset = [0.0...6.0] (arcsec)



# Simulated spectra

Y-offset=0.0, Z-offset = [0.0...6.0] (arcsec)

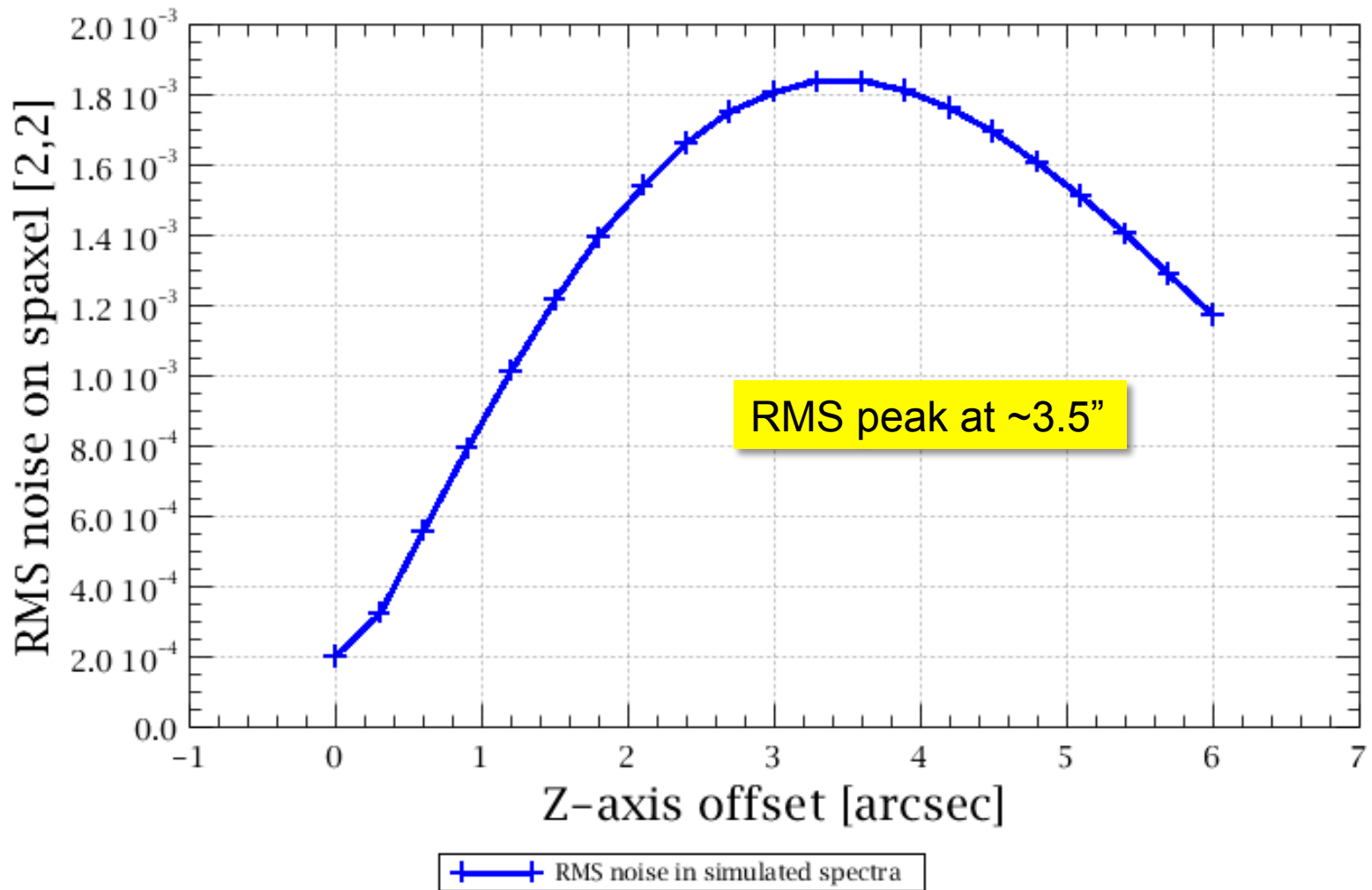


— Simulated product, Z-offset:0.0    — Simulated product, Z-offset:0.3  
— Simulated product, Z-offset:0.6



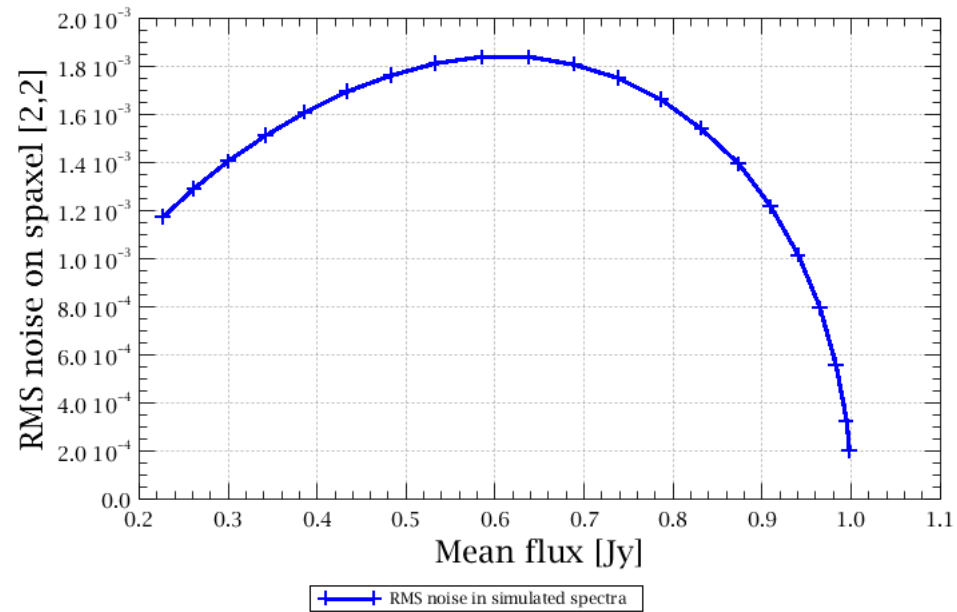
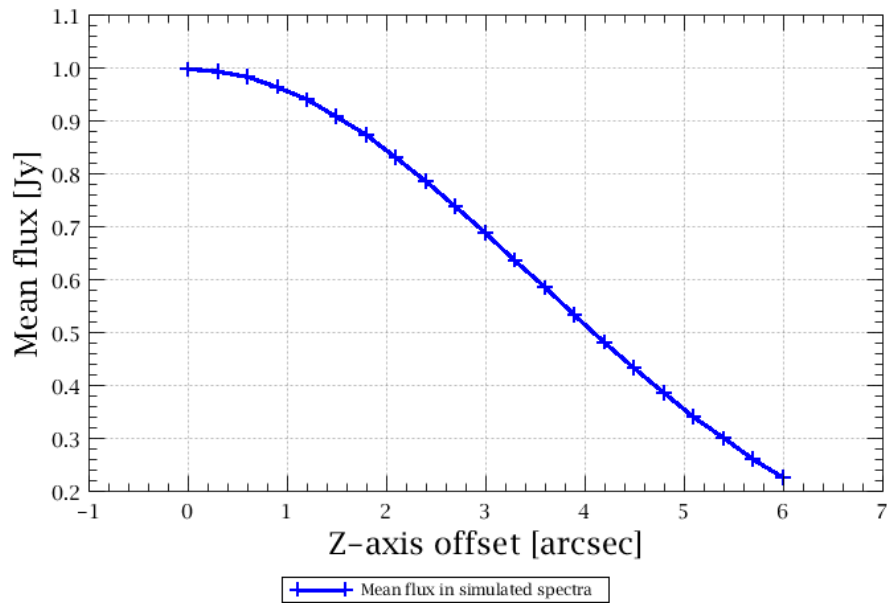
# Simulated spectra

Y-offset=0.0, Z-offset = [0.0...6.0] (arcsec)

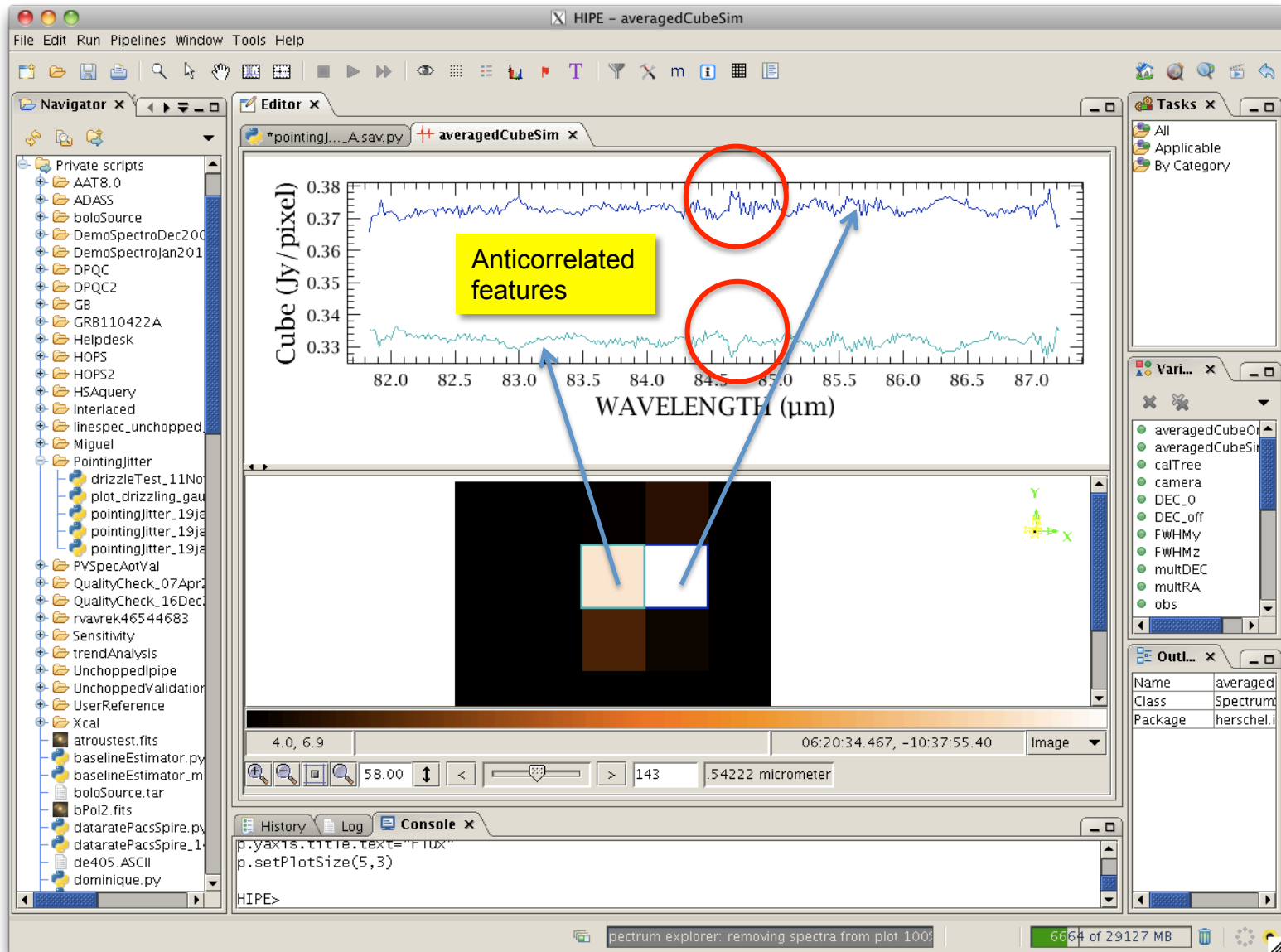


# Simulated spectra

Y-offset=0.0, Z-offset = [0.0...6.0] (arcsec)

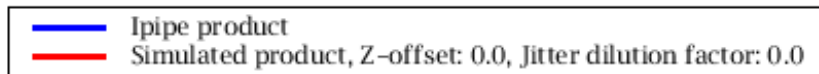
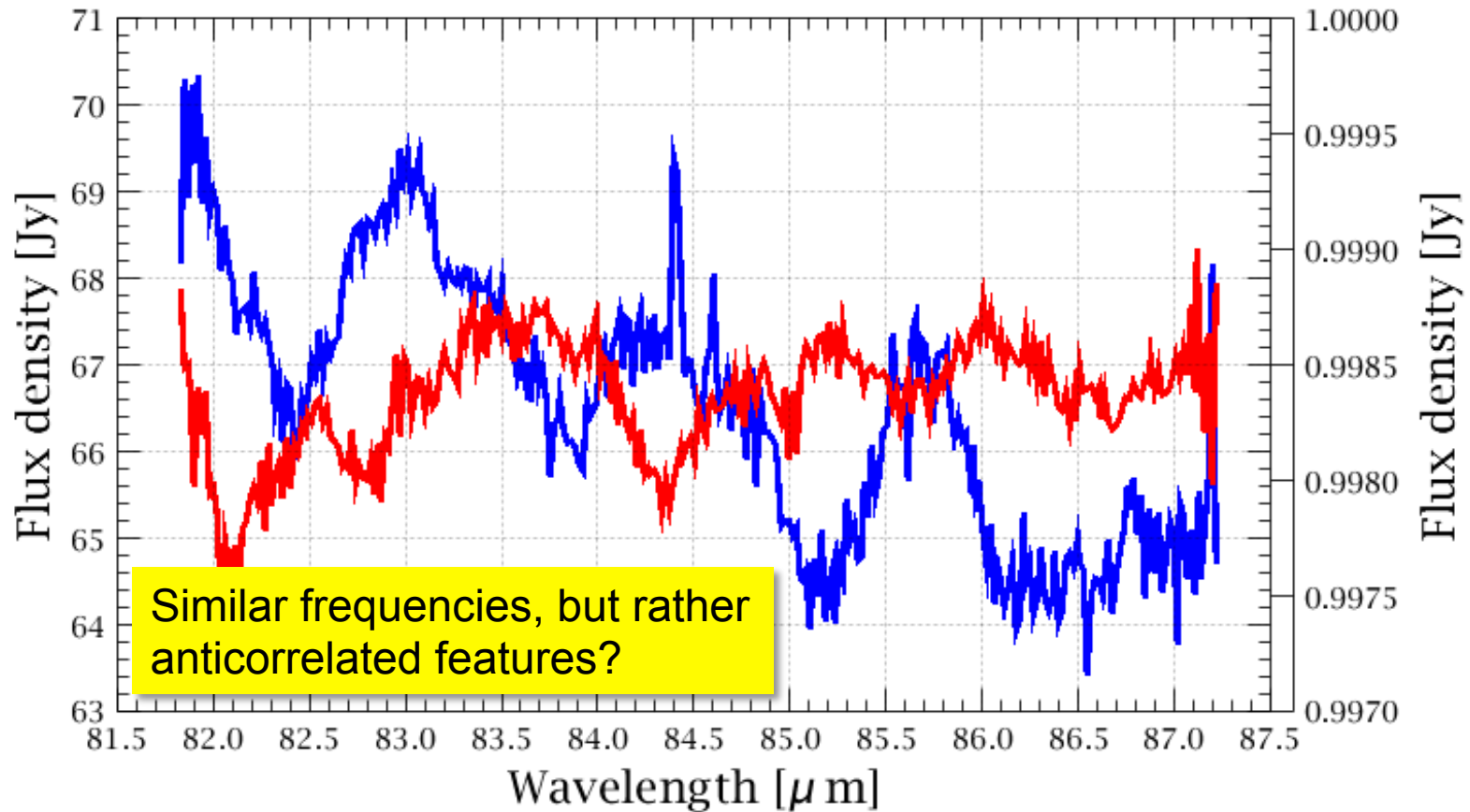


# Simulated spectra



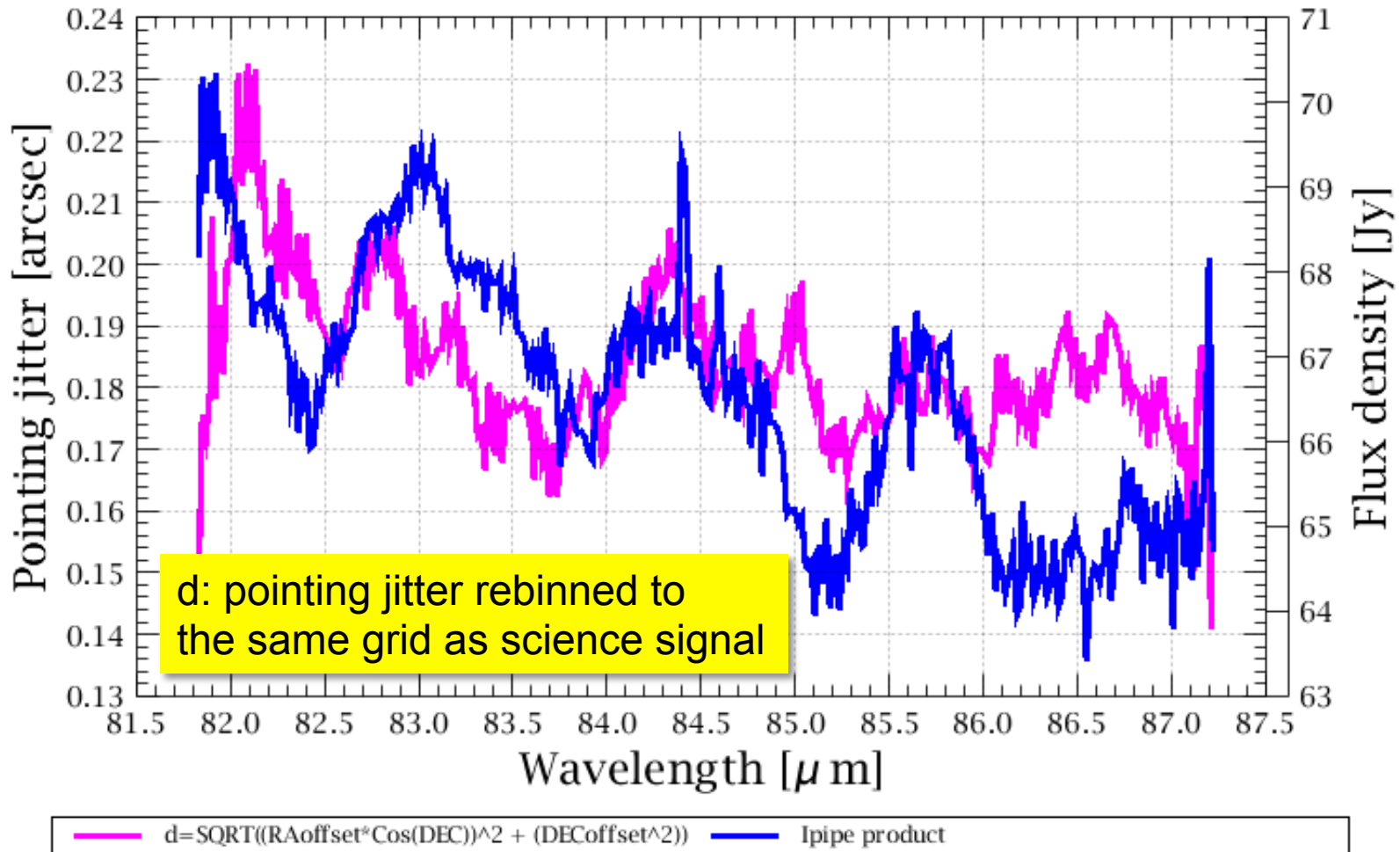
# Observed vs. simulated spectra

Y-offset=0.0, Z-offset =0.0



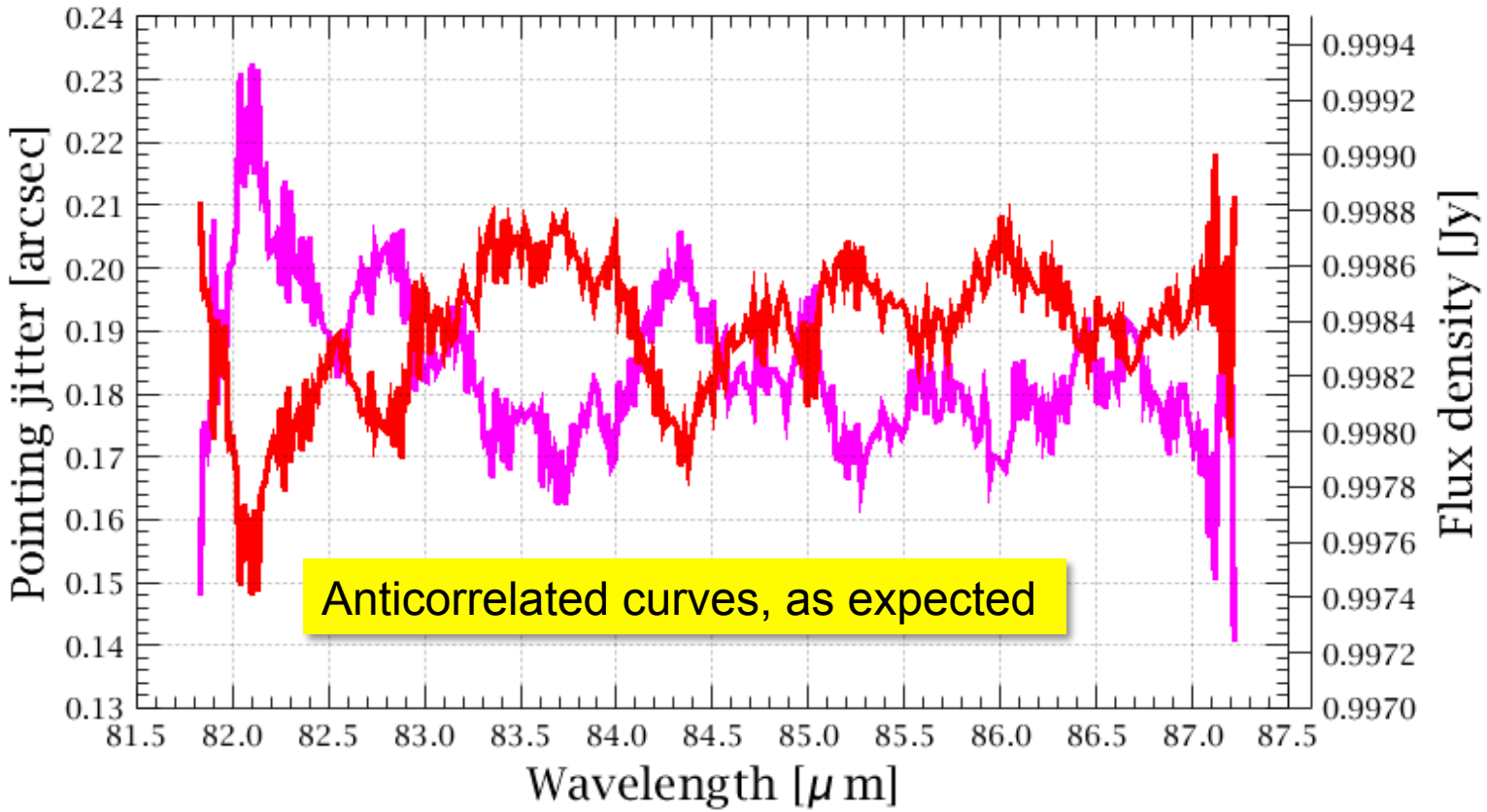
# Observed vs. simulated spectra

Y-offset=0.0, Z-offset =0.0



# Observed vs. simulated spectra

Y-offset=0.0, Z-offset =0.0



Anticorrelated curves, as expected

—  $d = \text{SQRT}((\text{RAoffset} * \text{Cos}(\text{DEC}))^2 + (\text{DECOffset})^2)$   
— Simulated product, Z-offset: 0.0, Jitter dilution factor: 0.0



# Summary v0.1

- RMS increases within 1-sigma APE offset
- Change in the noise power-spectrum shape (high frequencies start to dominate with increasing APE offset)
- Simulation reproduces noise frequencies somewhat similar to observation at Z-offset=0.0, but noise amplitude is factor  $\sim 3$  higher (!) in the observed spectrum
- Pixels should be correlated (with some offset?) but spaxels should be anti-correlated for a very bright source
- Maybe inverting the jitter pattern (d) could be a starting point (page 5, bottom-right figure) to better explain the relation between observed flux variation and jitter pattern