

**EMVA 1288 Datasheet**

This datasheet describes the specification according to the standard 1288 Standard for Characterization and Presentation of Specification Data for Image Sensors and Cameras of European Machine Vision Association (EMVA) (See [www.standard1288.org](http://www.standard1288.org)).

|                           |                             |                                  |                                      |
|---------------------------|-----------------------------|----------------------------------|--------------------------------------|
| Vendor                    | KAYA Instruments            | Sensor diagonal                  | 16.1mm                               |
| Model                     | Iron252C                    | Sensor                           | IMX252                               |
| Camera type               | Color                       | Sensor type                      | CMOS                                 |
| Date                      | 06-Nov-2022 11:58:59        | Shutter type                     | Global                               |
| Data type                 | Single                      | Overlap capabilities             | Overlapping                          |
| Sensor type               | CMOS                        | Frame rate                       | 90 Hz                                |
| Lens category             | C-Mount                     | Exposure control                 | by irradiance                        |
| Resolution                | 2048 x 1536 ,12 bits        | Exposure time                    | 9001.778 $\mu$ s                     |
| Pixel size                | 3.45 $\mu$ m x 3.45 $\mu$ m | Illumination                     | Variable with constant exposure time |
| Maximum readout rate      | 90 fps                      | Irradiation Steps                | 50                                   |
| Dark current compensation | No                          | Irradiation calibration accuracy | -                                    |
| Interface type            | CXP-12                      | Irradiation measurement error    | -                                    |
| Serial number             | 4221017                     | Standart version                 | 4.0 Linear                           |
| Firmware version          | 4.1.3-2021.10.27            | Light source                     | Integrating Sphere                   |

International Distributor

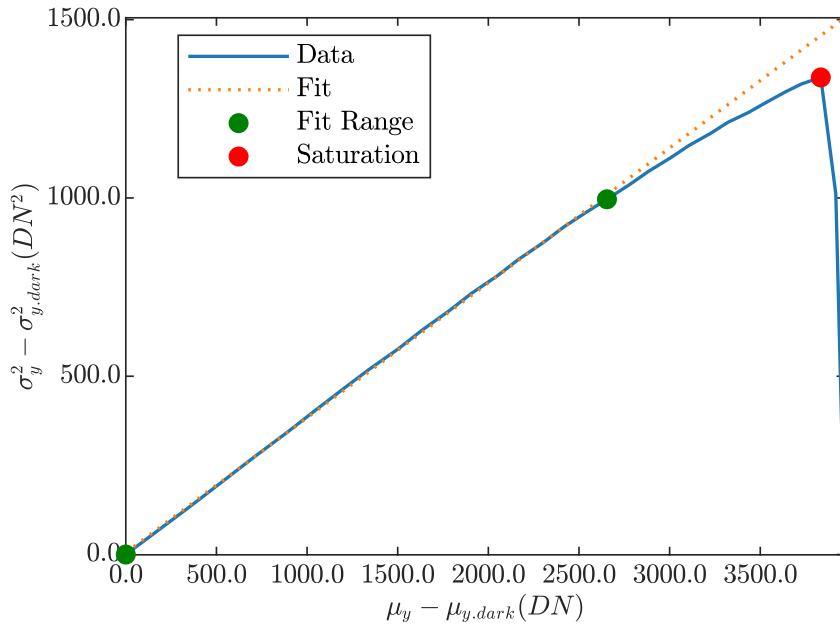


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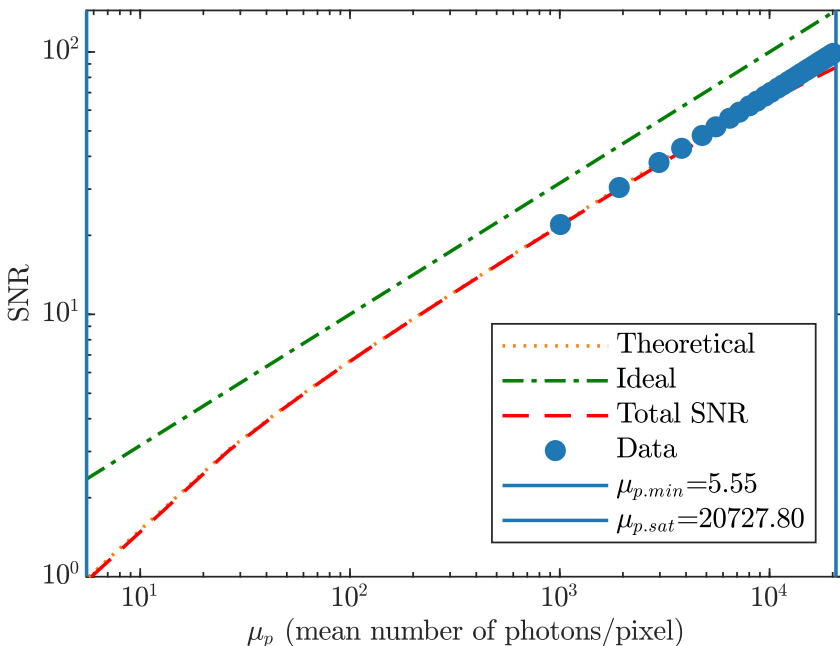
**Summary Sheet for Operation Point 1 at a Wavelength of 520 nm**

| Camera setting |             | Operation point parameters |        |
|----------------|-------------|----------------------------|--------|
| Gain           | GainLevelx1 | Environmental temperature  | 24     |
| Black level    | 128         | Camera body temperature    | 33.93  |
|                |             | Sensor temperature         | 43.544 |
|                |             | Processor temperature      | 42     |

**Photon Transfer**

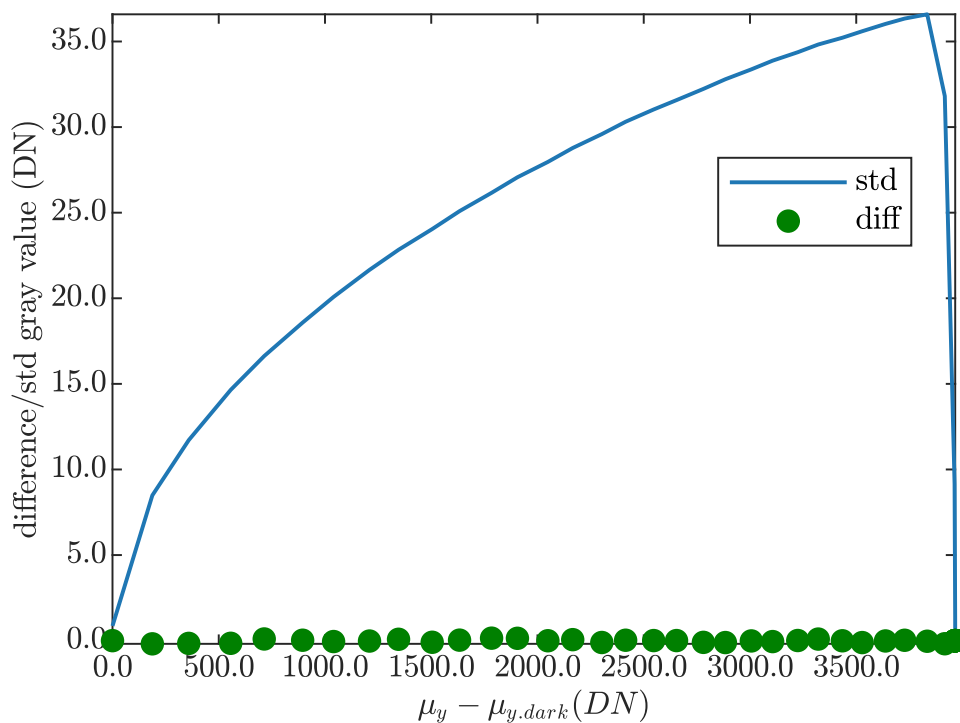


**Signal-to-Noise Ratio**

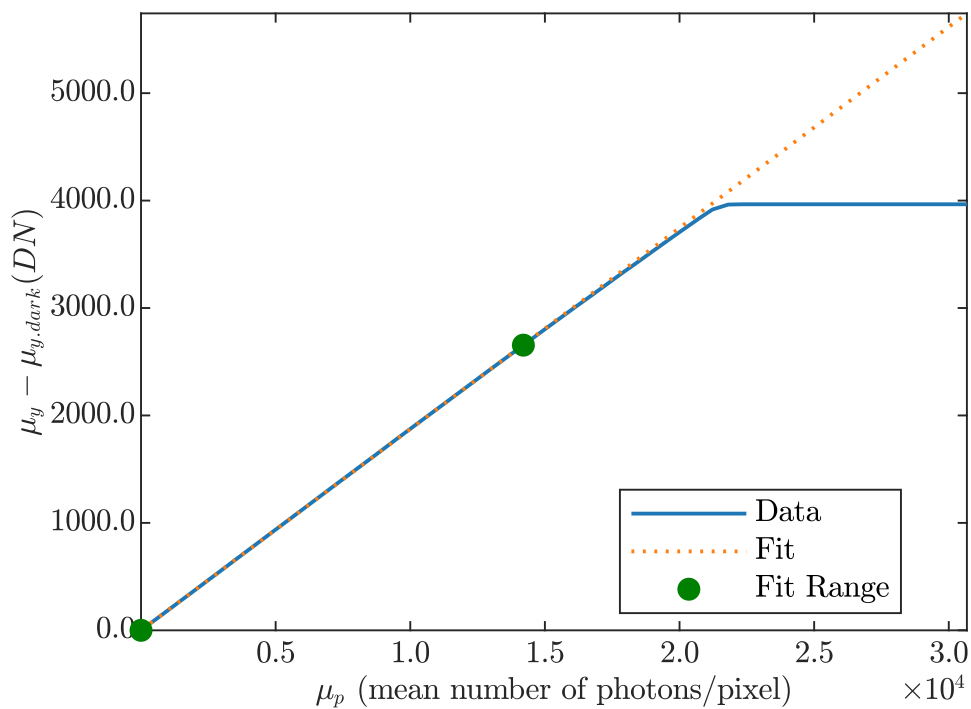


| Performance                           |  |
|---------------------------------------|--|
| <b>Quantum efficiency</b>             |  |
| $\eta$                                | 48.4875 %                                |
| <b>System gain</b>                    |  |
| K                                     | 0.38697 DN/e <sup>-</sup>                |
| 1/K                                   | 2.5842 e <sup>-</sup> /DN                |
| <b>Temporal dark noise</b>            |  |
| $\sigma_d$                            | 2.0611 e <sup>-</sup>                    |
| $\sigma_{y,dark}$                     | 0.84824 DN                               |
| <b>Signal-to-noise ratio</b>          |  |
| SNR <sub>max</sub>                    | 100.2517                                 |
|                                       | 40.0218 dB                               |
|                                       | 6.6475 bit                               |
| 1/SNR <sub>max</sub>                  | 0.99749 %                                |
| <b>Absolute sensitivity threshold</b> |  |
| $\mu_{e,min}$                         | 2.692 e <sup>-</sup>                     |
| $\mu_{e,min,area}$                    | 0.22617 e <sup>-</sup> /μm <sup>2</sup>  |
| <b>Saturation capacity</b>            |  |
| $\mu_{e,sat}$                         | 10050.4043 e <sup>-</sup>                |
| $\mu_{e,sat,area}$                    | 844.3944 e <sup>-</sup> /μm <sup>2</sup> |
| <b>Dynamic range</b>                  |  |
| DR                                    | 3733.4737                                |
|                                       | 71.4423 dB                               |
|                                       | 11.8663 bit                              |
| <b>Spatial nonuniformities</b>        |  |
| DSNU <sub>1288</sub>                  | 0.58085 e <sup>-</sup>                   |
| DSNU <sub>1288,col</sub>              | 0.10849 e <sup>-</sup>                   |
| DSNU <sub>1288,row</sub>              | 0.074442 e <sup>-</sup>                  |
| DSNU <sub>1288,pix</sub>              | 0.56575 e <sup>-</sup>                   |
| PRNU <sub>1288</sub>                  | 0.5634 %                                 |
| PRNU <sub>1288,col</sub>              | 0.13802 %                                |
| PRNU <sub>1288,row</sub>              | 0.0058462 %                              |
| PRNU <sub>1288,pix</sub>              | 0.5462 %                                 |
| <b>Linearity error</b>                |  |
| LE                                    | 0.0020771 %                              |
| <b>Dark current</b>                   |  |
| $\mu_{l,mean}$                        | 14.3787 e <sup>-</sup> /s                |
| $\mu_{l,var}$                         | 0.80389 e <sup>-</sup> /s                |

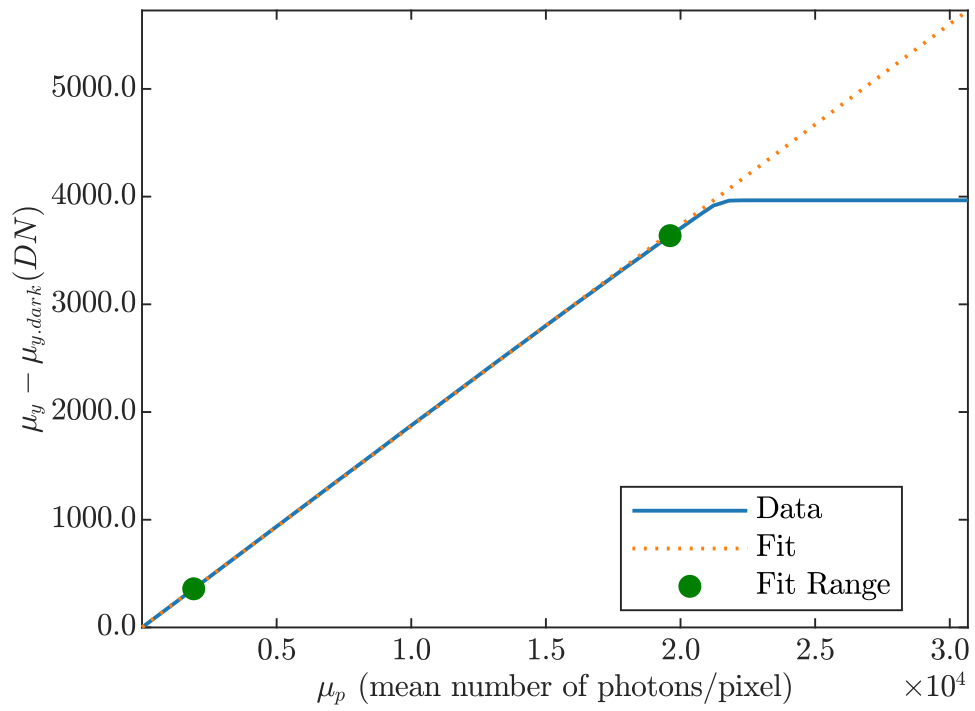
### Stability check



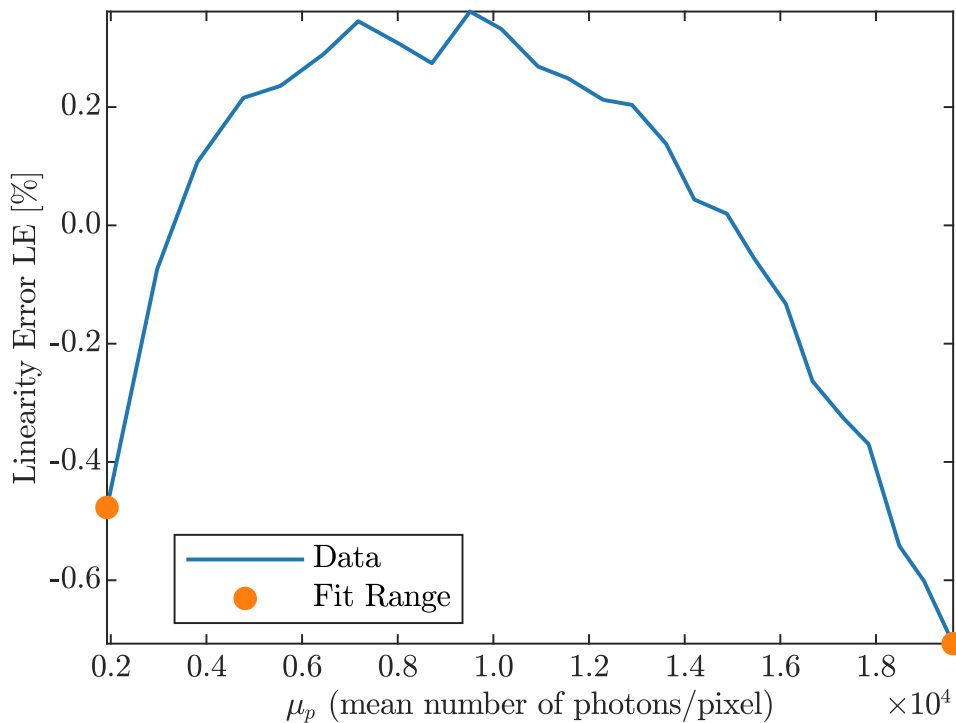
### Sensitivity



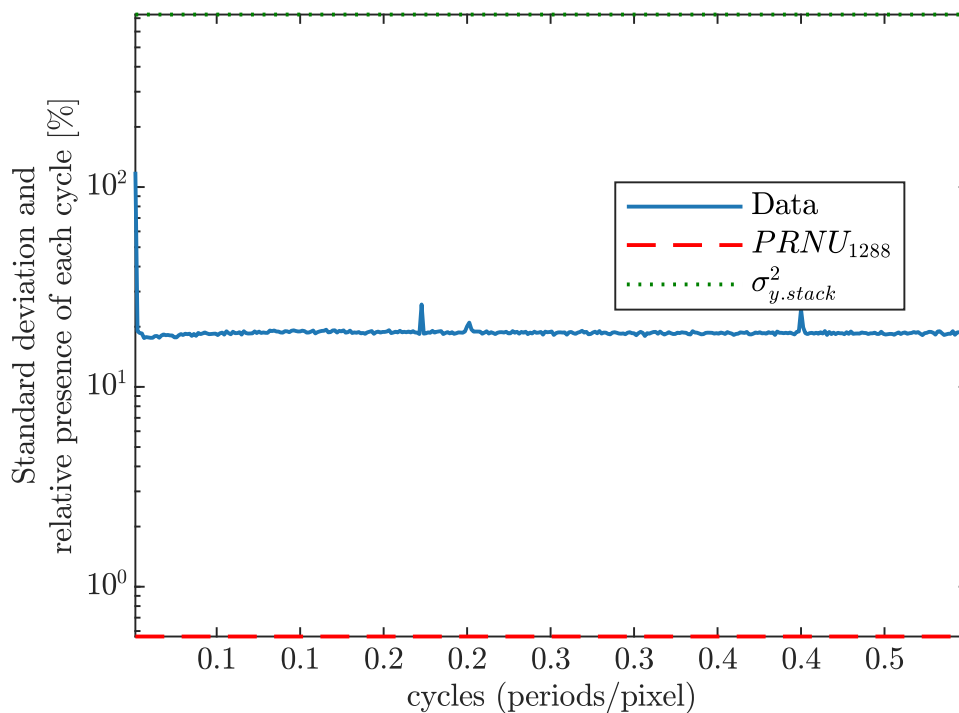
### Linearity



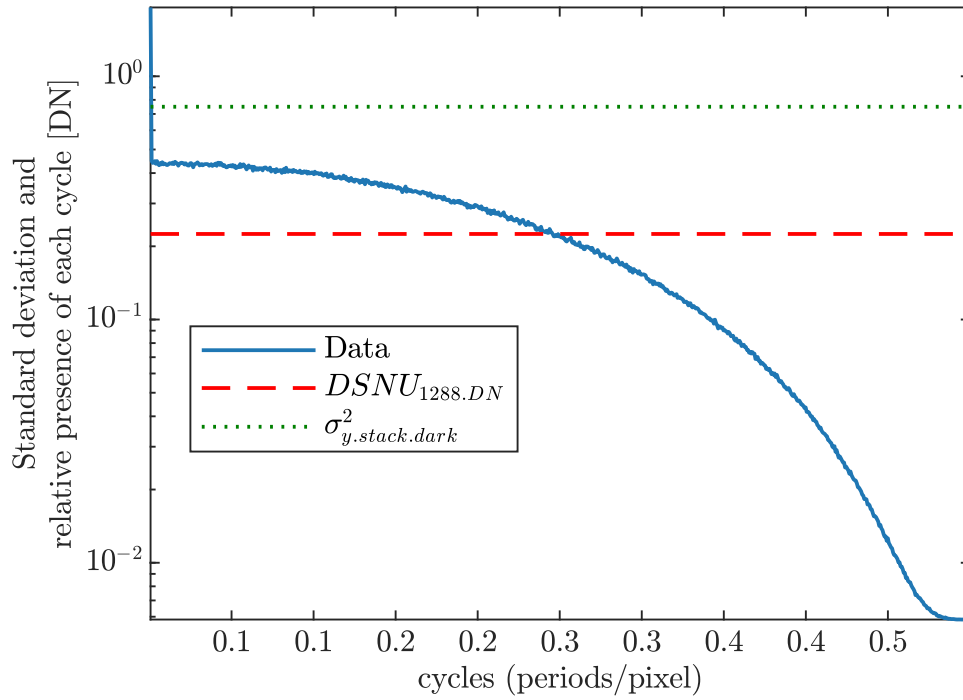
### Deviation Linearity



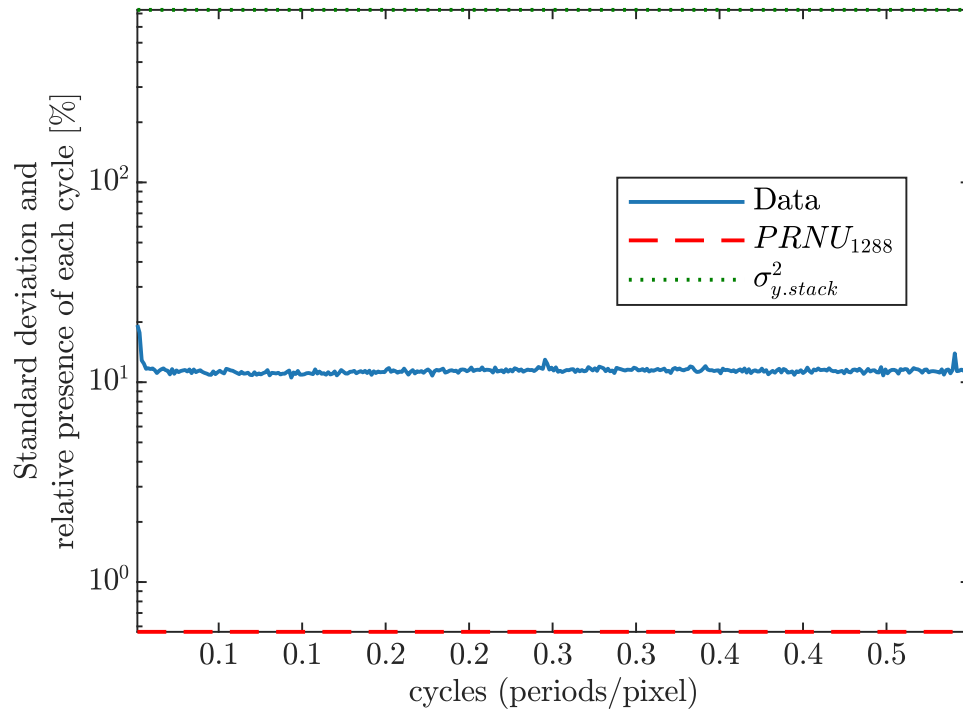
### Horizontal Spectrogram PRNU



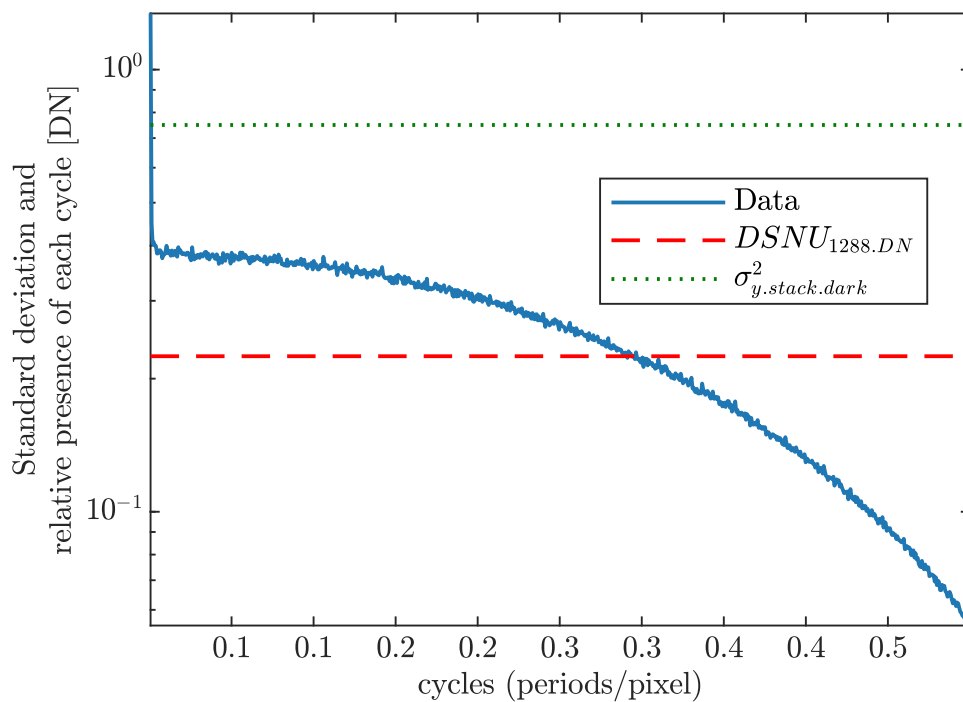
### Horizontal Spectrogram DSNU



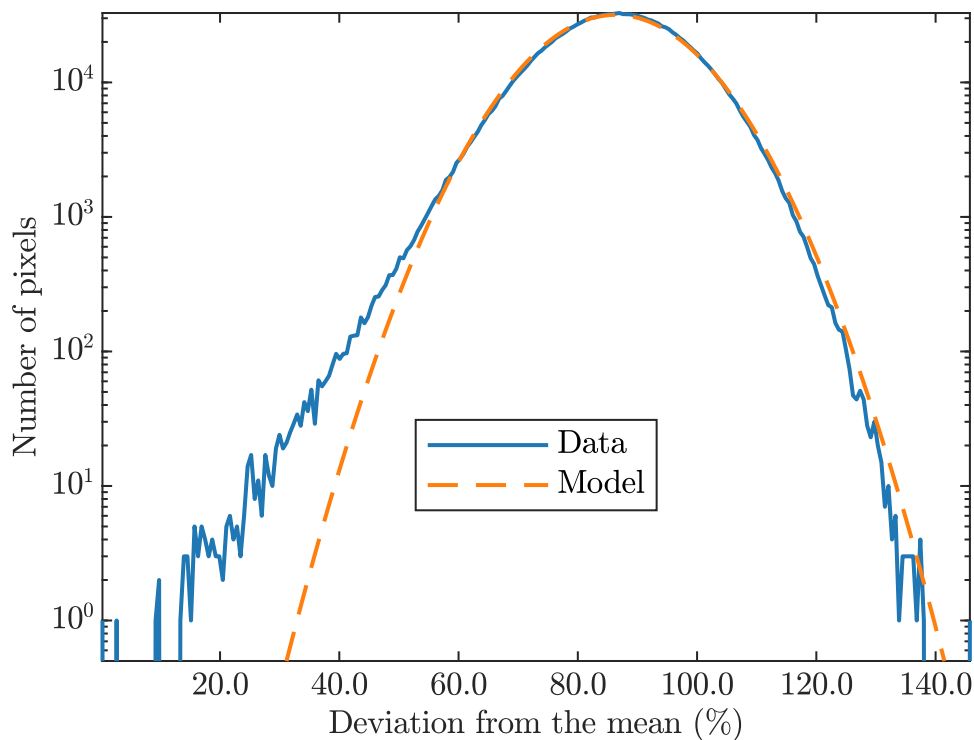
### Vertical Spectrogram PRNU



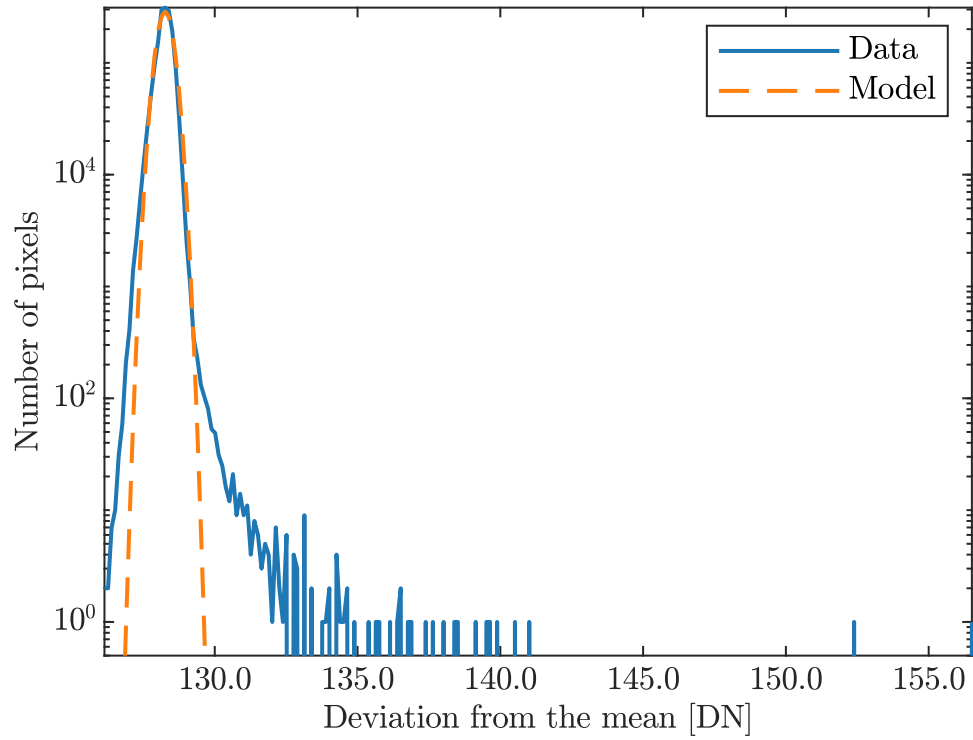
### Vertical Spectrogram DSNU



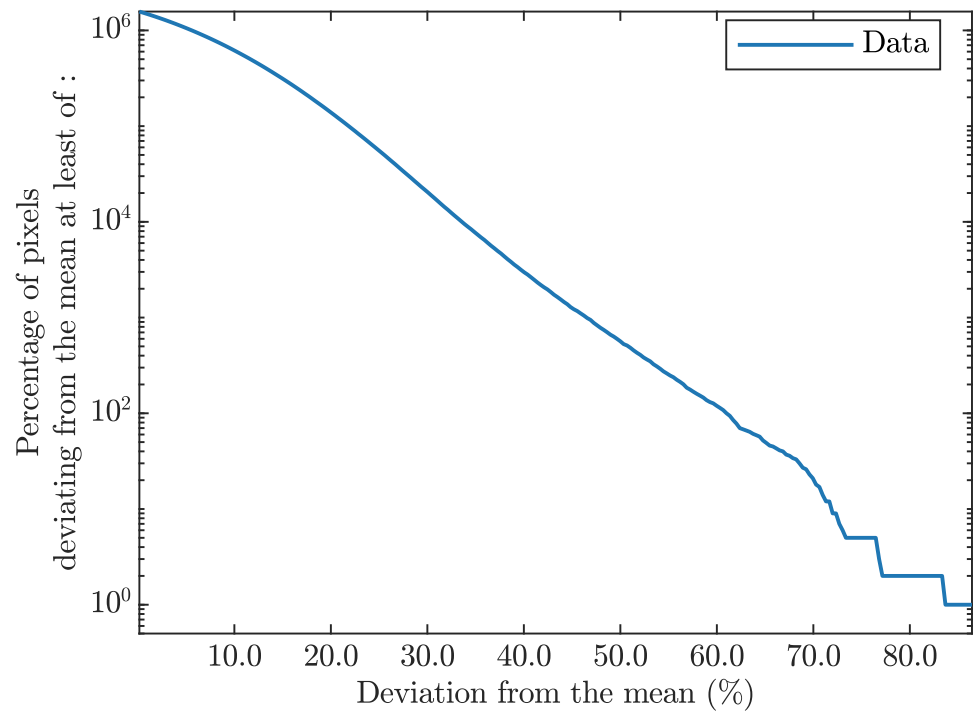
### Logarithmic Histogram PRNU



### Logarithmic Histogram DSNU

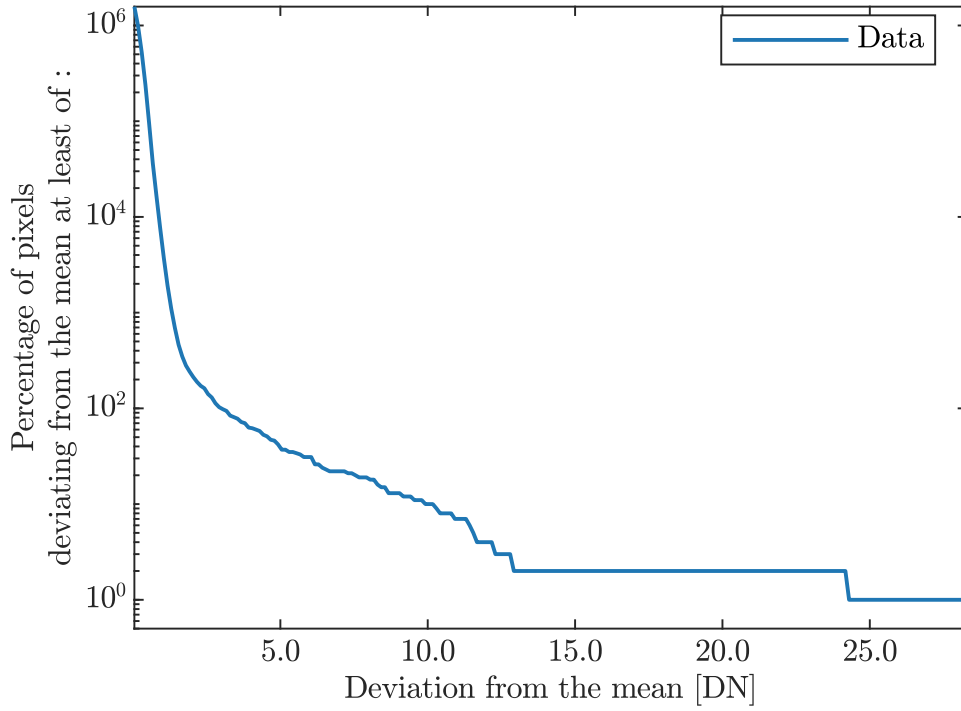


### Accumulated Log Histogram PRNU

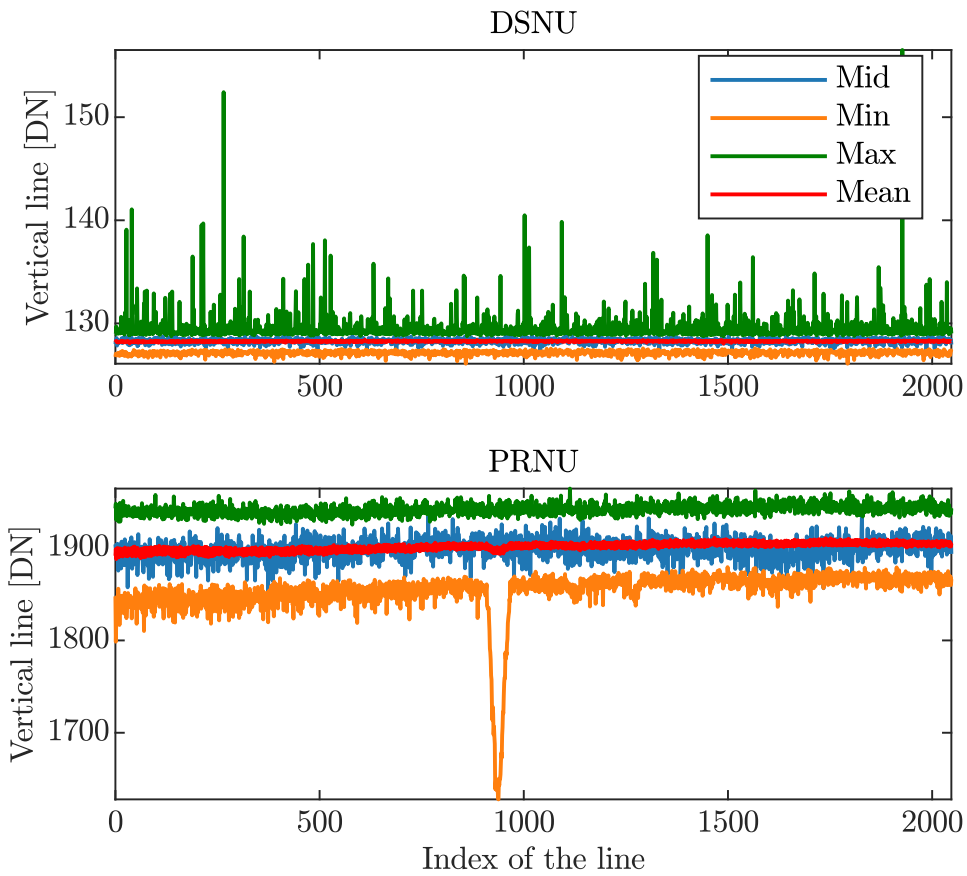




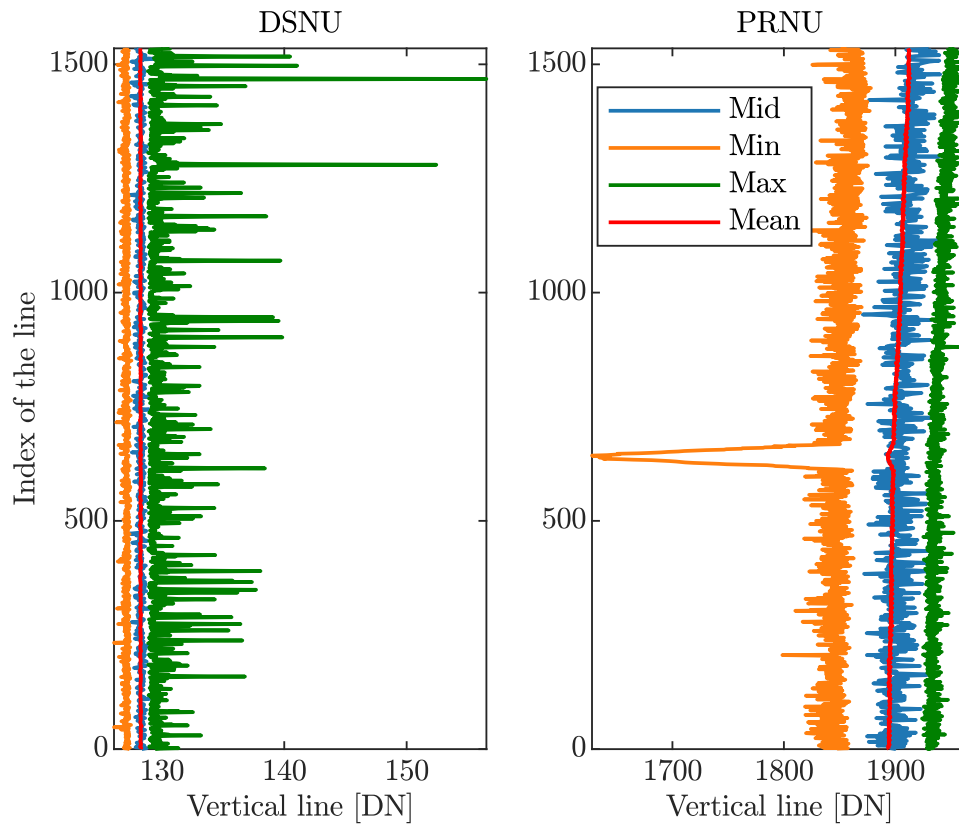
### Accumulated Log Histogram DSNU



### Horizontal Profile



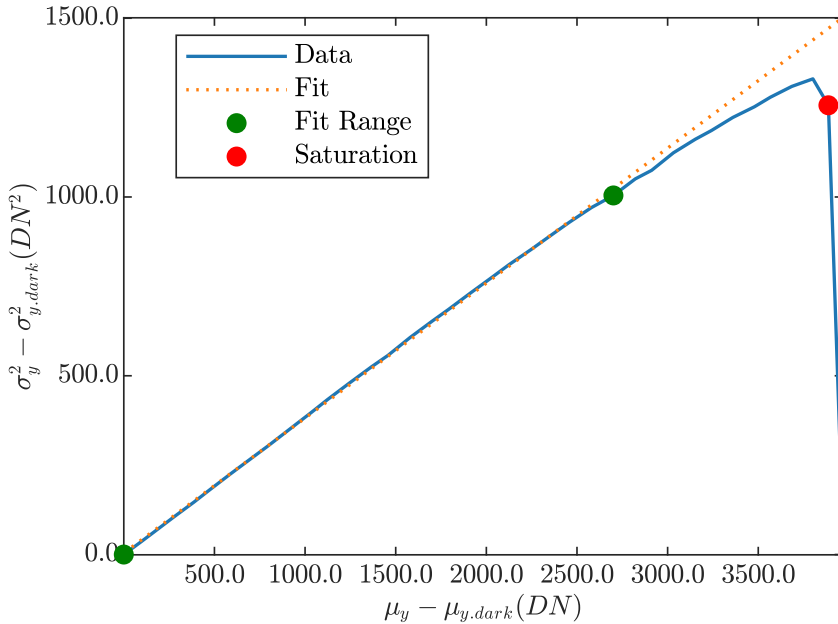
### Vertical Profile



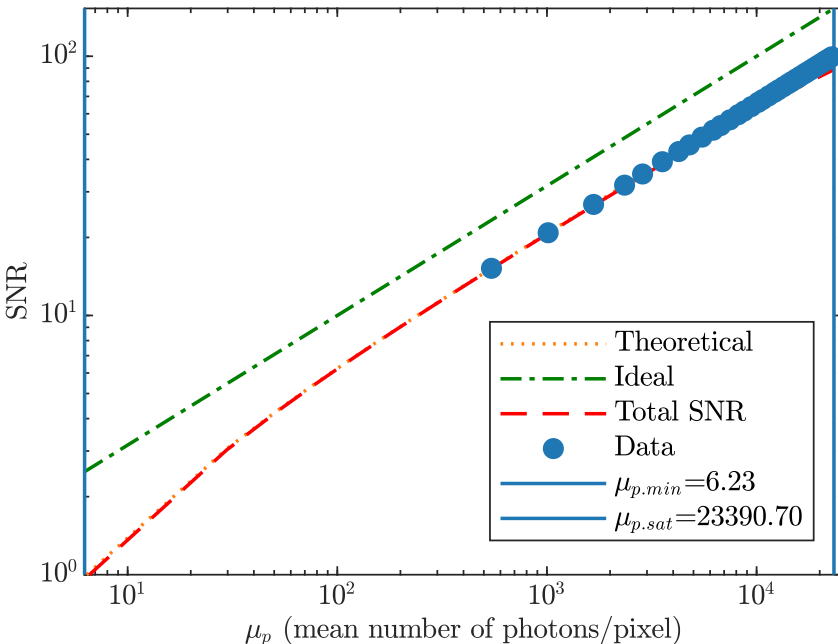
Summary Sheet for Operation Point 2 at a Wavelength of 632 nm

| Camera setting |             | Operation point parameters |        |
|----------------|-------------|----------------------------|--------|
| Gain           | GainLevelx1 | Environmental temperature  | 24.25  |
| Black level    | 128         | Camera body temperature    | 33.5   |
|                |             | Sensor temperature         | 43.848 |
|                |             | Processor temperature      | 42     |

Photon Transfer

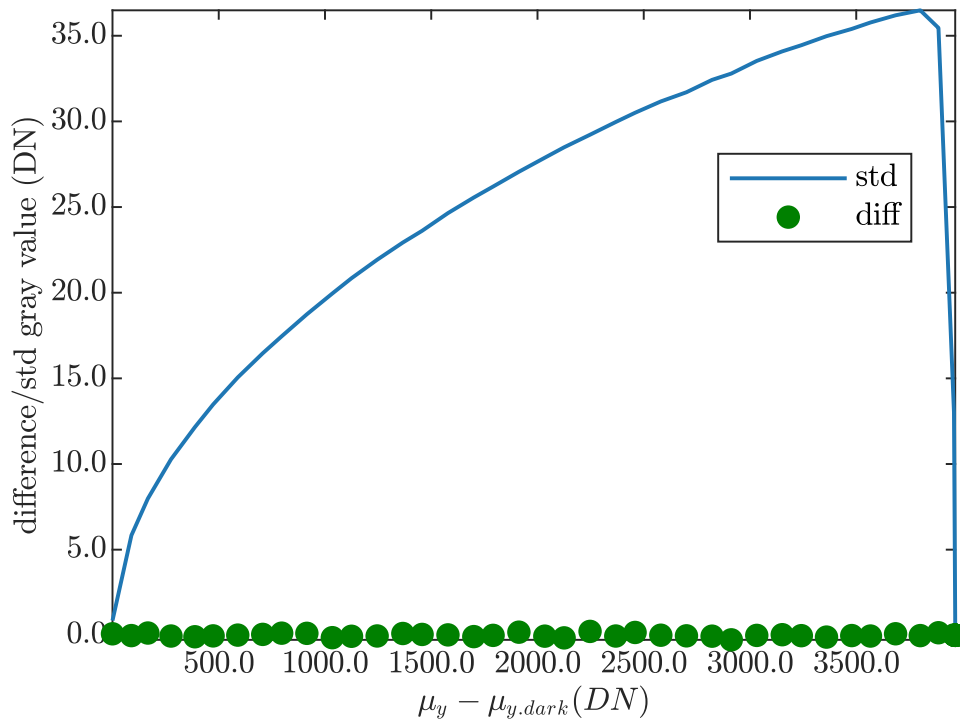


Signal-to-Noise Ratio

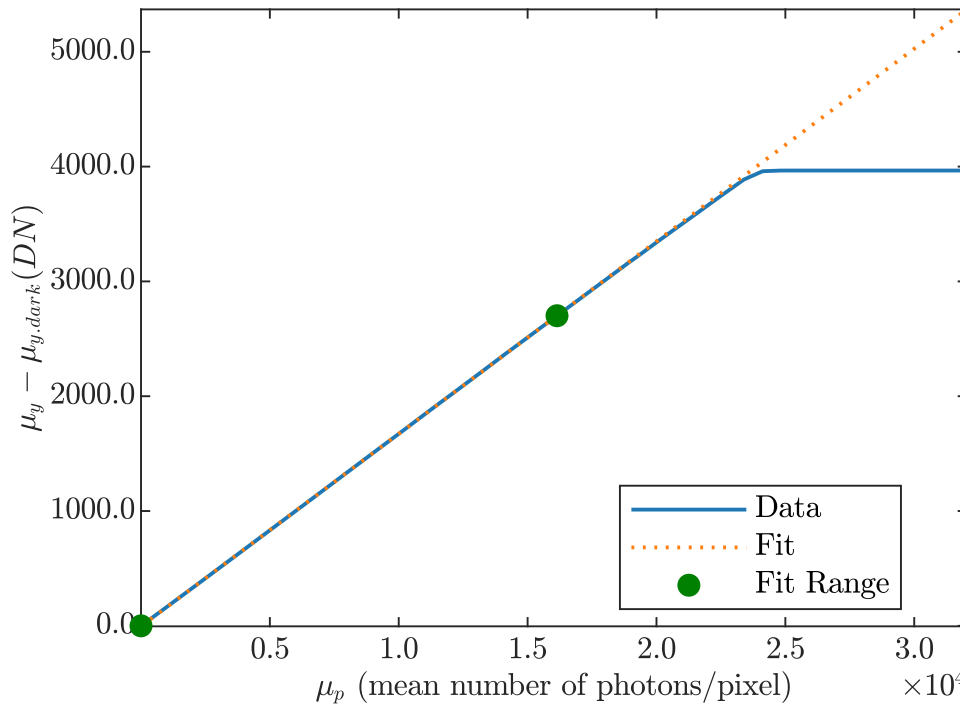


| Performance                           |  |
|---------------------------------------|--|
| <b>Quantum efficiency</b>             |  |
| $\eta$                                | 43.3666 %                                |
| <b>System gain</b>                    |  |
| K                                     | 0.38504 DN/e <sup>-</sup>                |
| 1/K                                   | 2.5971 e <sup>-</sup> /DN                |
| <b>Temporal dark noise</b>            |  |
| $\sigma_d$                            | 2.0715 e <sup>-</sup>                    |
| $\sigma_{y, \text{dark}}$             | 0.84824 DN                               |
| <b>Signal-to-noise ratio</b>          |  |
| SNR <sub>max</sub>                    | 100.7162                                 |
|                                       | 40.062 dB                                |
|                                       | 6.6542 bit                               |
| 1/SNR <sub>max</sub>                  | 0.99289 %                                |
| <b>Absolute sensitivity threshold</b> |  |
| $\mu_{e, \text{min}}$                 | 2.703 e <sup>-</sup>                     |
| $\mu_{e, \text{min, area}}$           | 0.22709 e <sup>-</sup> /μm <sup>2</sup>  |
| <b>Saturation capacity</b>            |  |
| $\mu_{e, \text{sat}}$                 | 10143.7567 e <sup>-</sup>                |
| $\mu_{e, \text{sat, area}}$           | 852.2375 e <sup>-</sup> /μm <sup>2</sup> |
| <b>Dynamic range</b>                  |  |
| DR                                    | 3752.8327                                |
|                                       | 71.4872 dB                               |
|                                       | 11.8738 bit                              |
| <b>Spatial nonuniformities</b>        |  |
| DSNU <sub>1288</sub>                  | 0.58465 e <sup>-</sup>                   |
| DSNU <sub>1288, col</sub>             | 0.11655 e <sup>-</sup>                   |
| DSNU <sub>1288, row</sub>             | 0.075742 e <sup>-</sup>                  |
| DSNU <sub>1288, pix</sub>             | 0.56788 e <sup>-</sup>                   |
| PRNU <sub>1288</sub>                  | 0.53156 %                                |
| PRNU <sub>1288, col</sub>             | 0.043027 %                               |
| PRNU <sub>1288, row</sub>             | 0.025359 %                               |
| PRNU <sub>1288, pix</sub>             | 0.52921 %                                |
| <b>Linearity error</b>                |  |
| LE                                    | 0.00055031 %                             |
| <b>Dark current</b>                   |  |
| $\mu_{l, \text{mean}}$                | 14.3787 e <sup>-</sup> /s                |
| $\mu_{l, \text{var}}$                 | 0.80389 e <sup>-</sup> /s                |

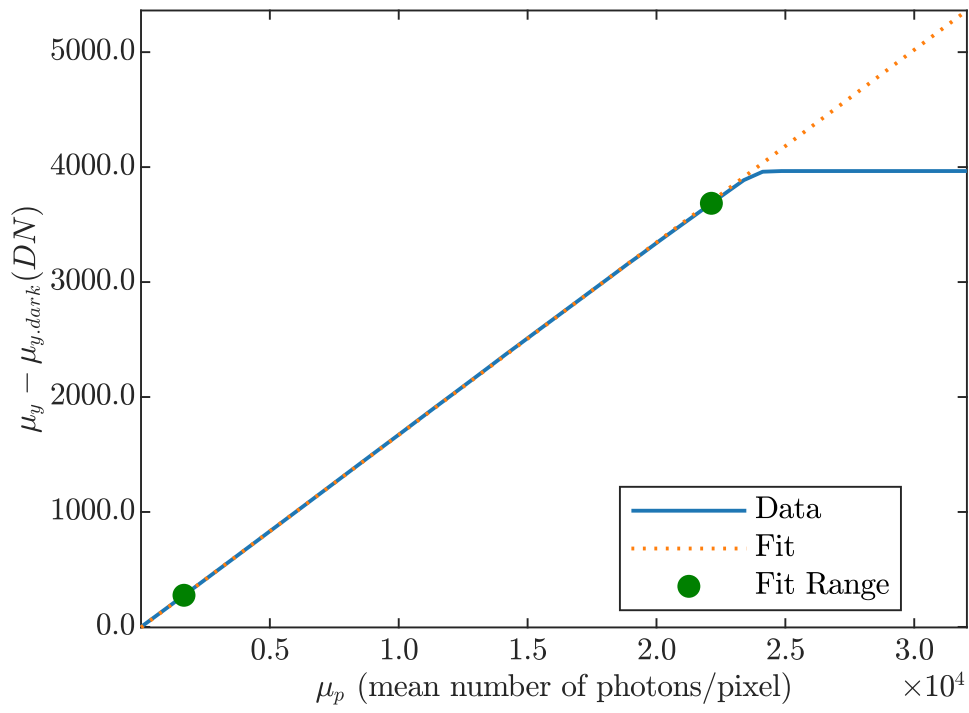
### Stability check



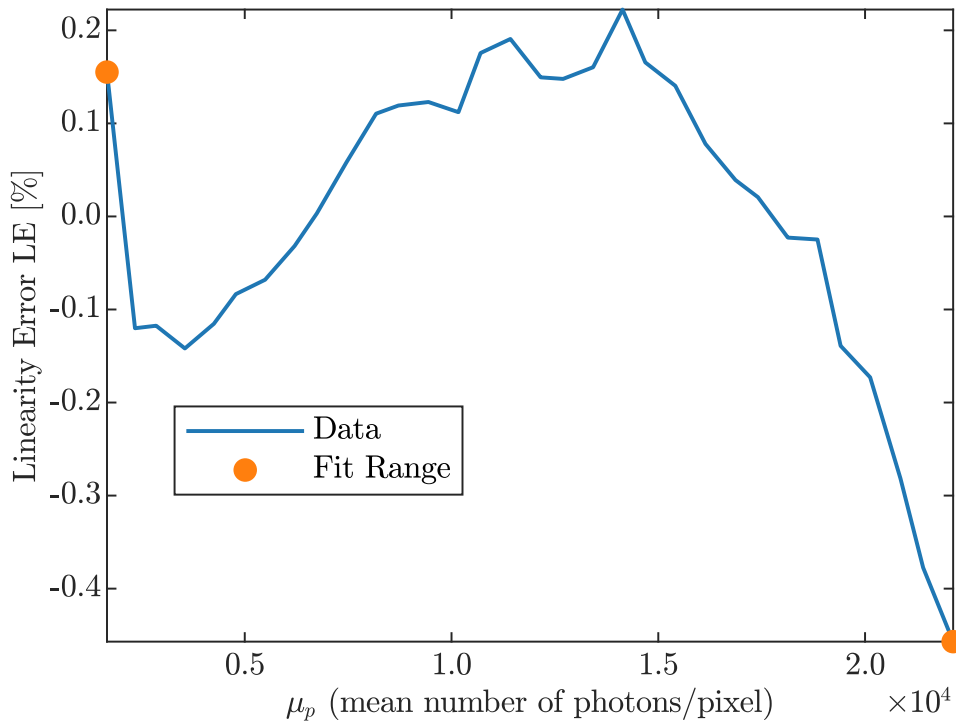
### Sensitivity



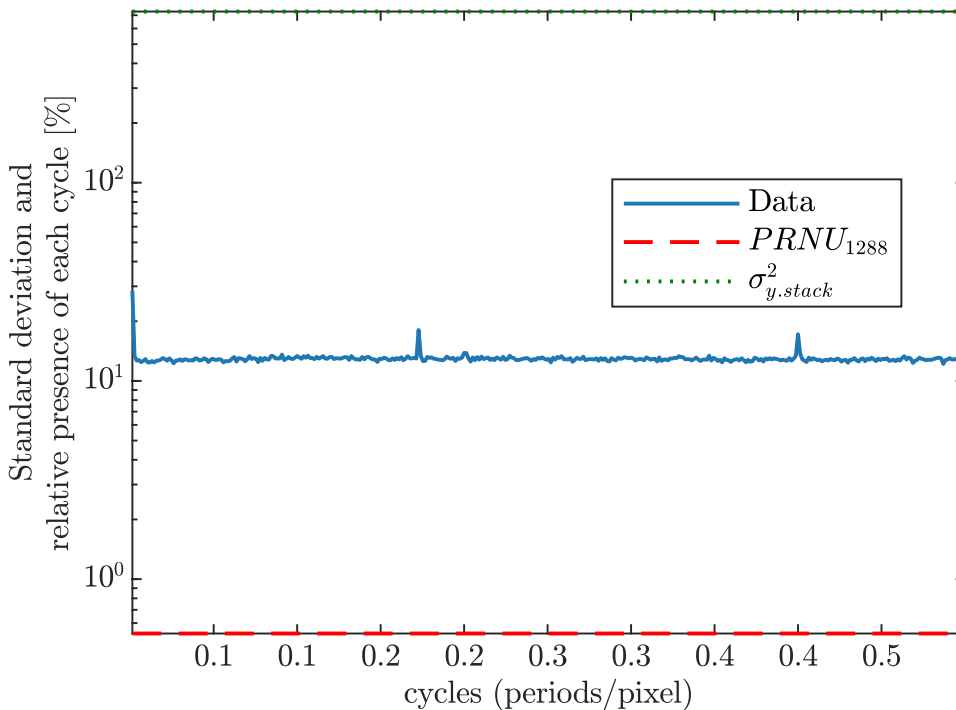
### Linearity



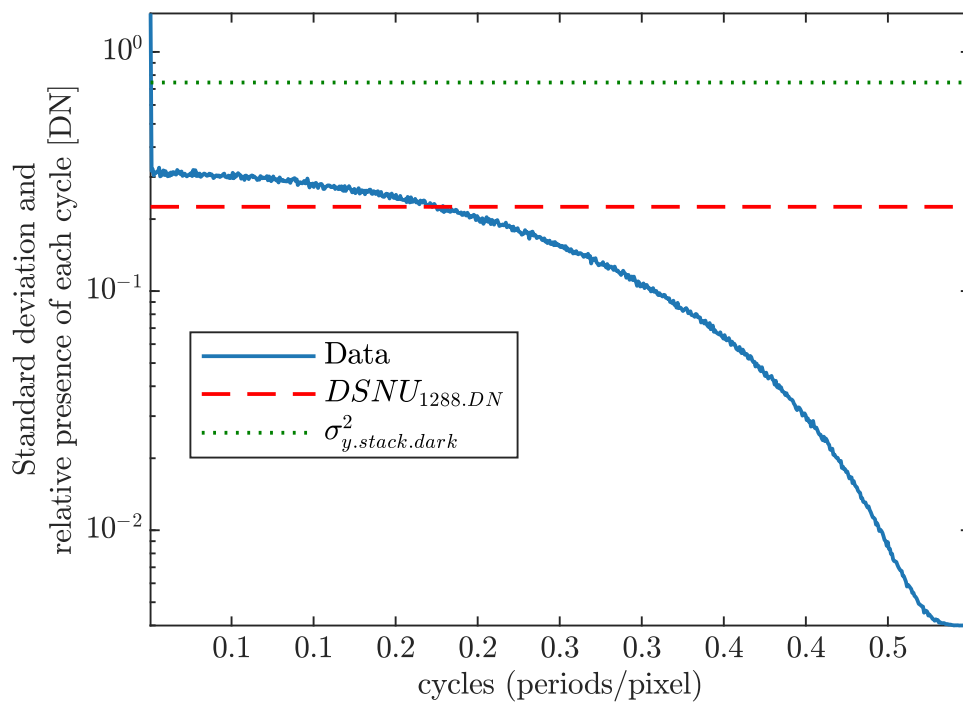
### Deviation Linearity



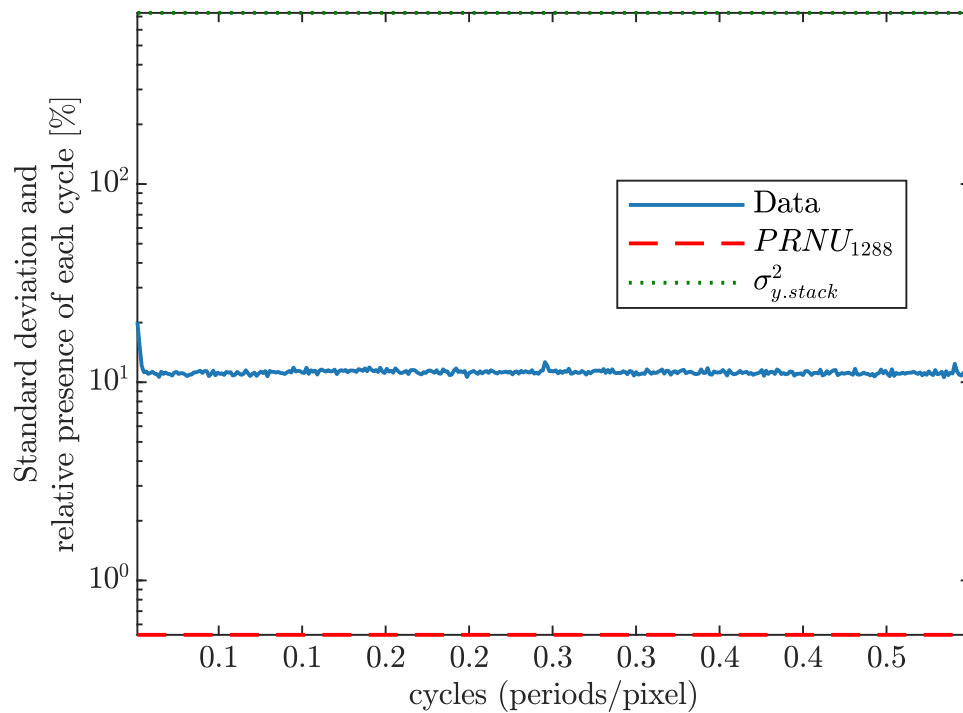
### Horizontal Spectrogram PRNU



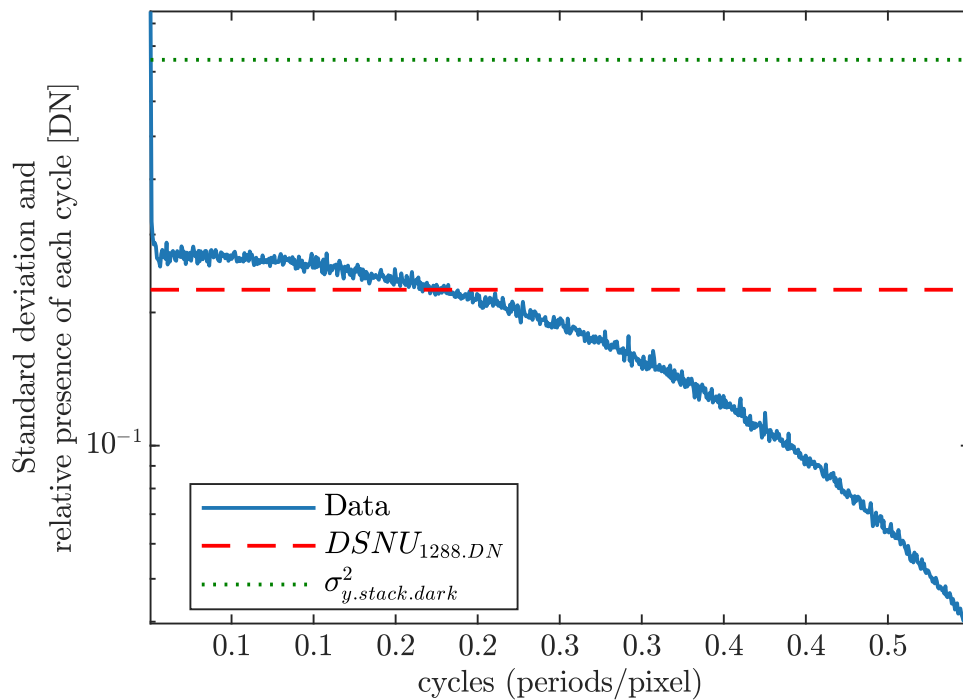
### Horizontal Spectrogram DSNU



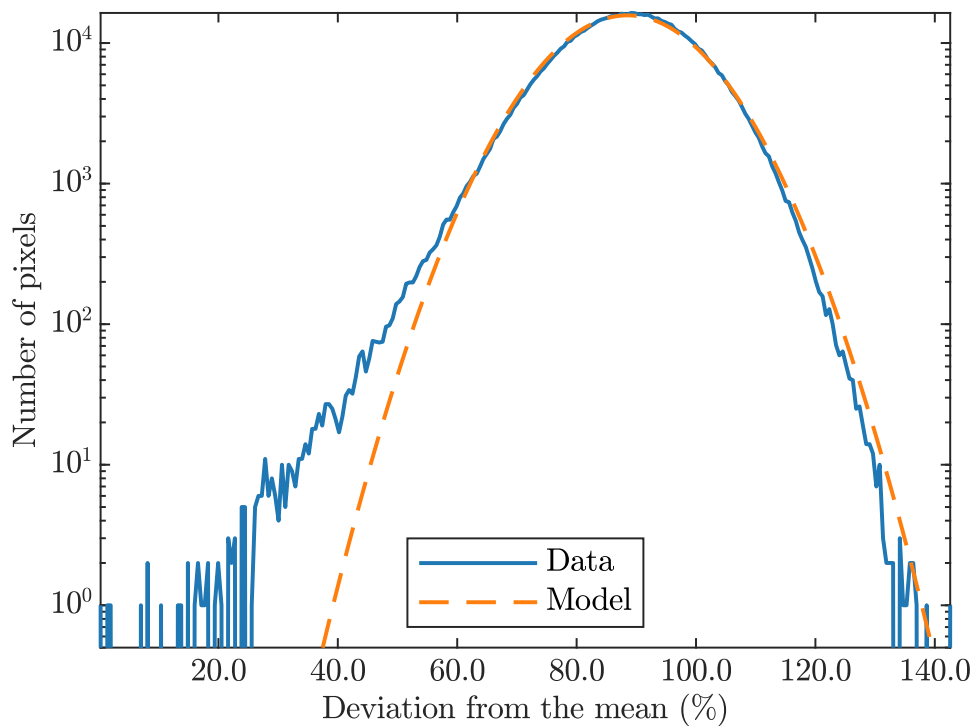
### Vertical Spectrogram PRNU



### Vertical Spectrogram DSNU

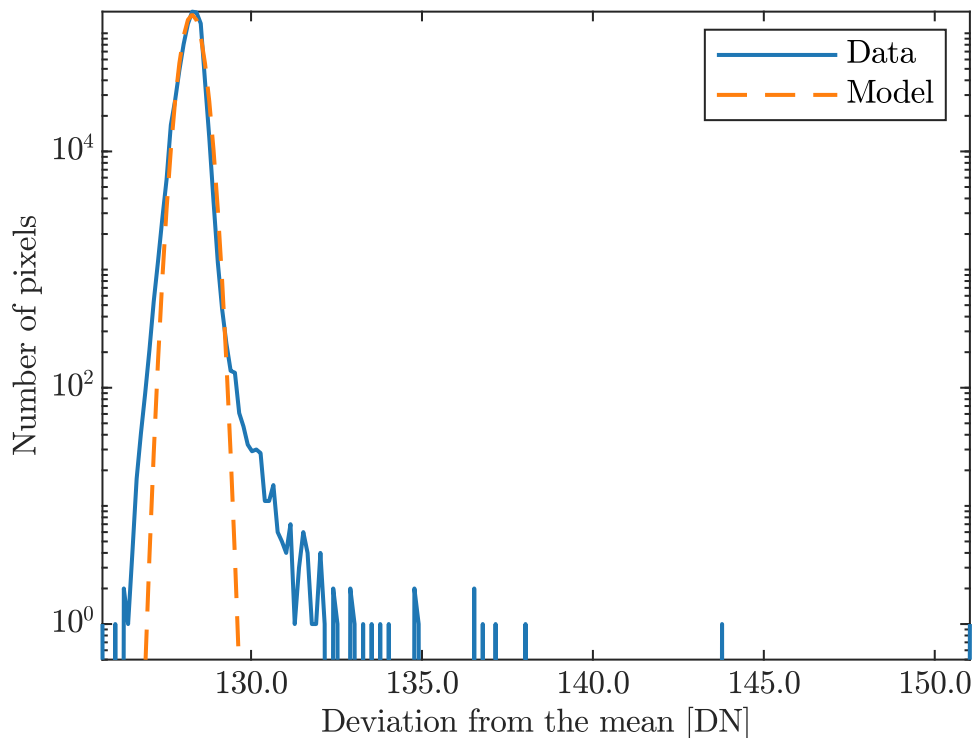


### Logarithmic Histogram PRNU

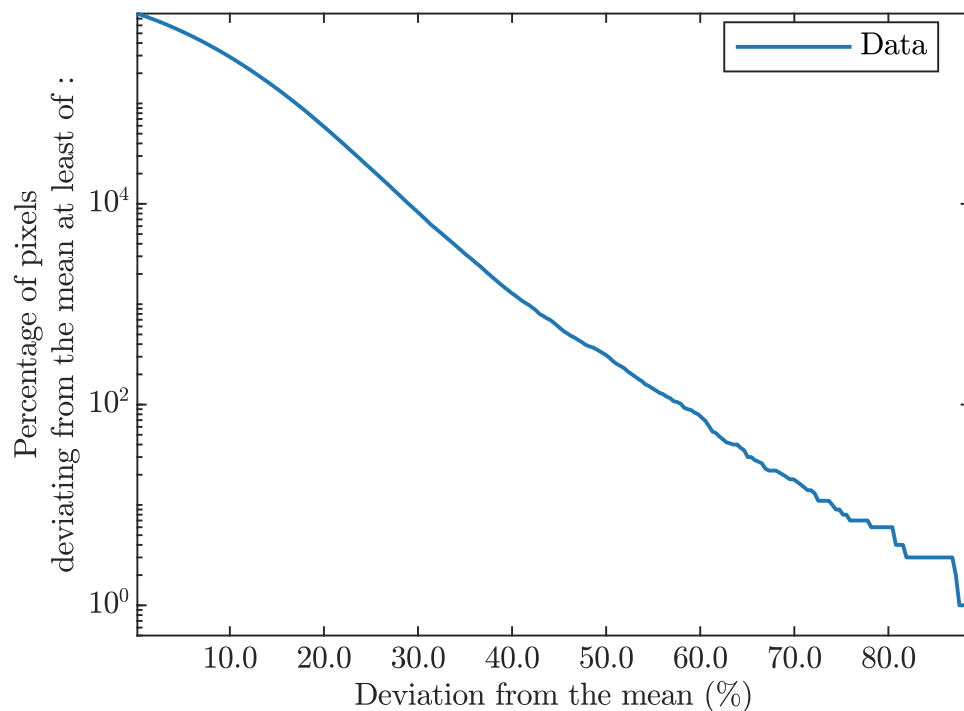




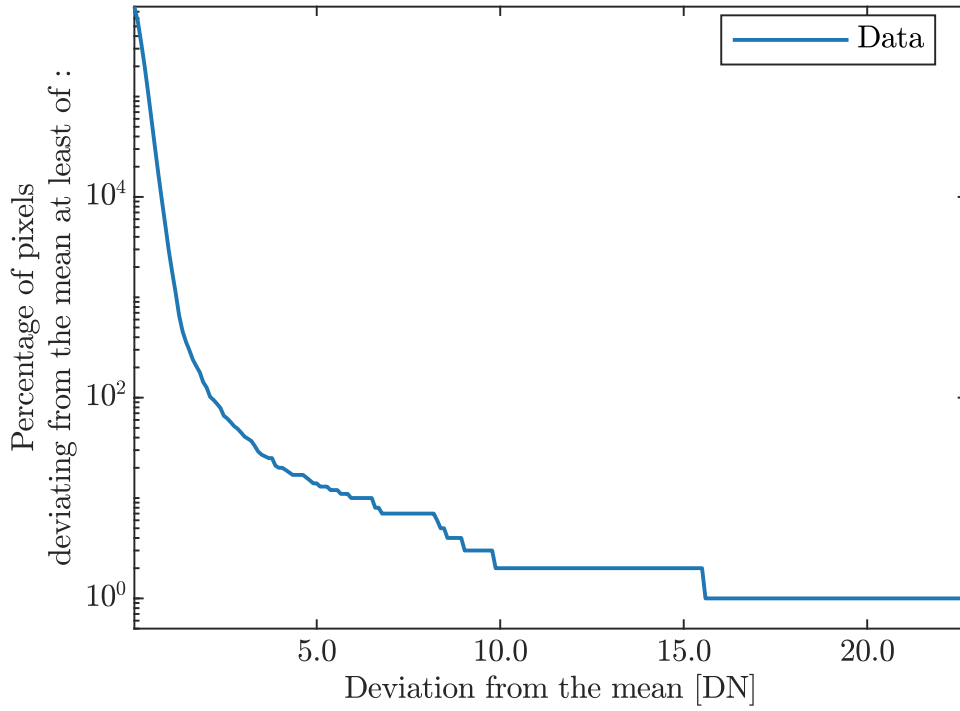
### Logarithmic Histogram DSNU



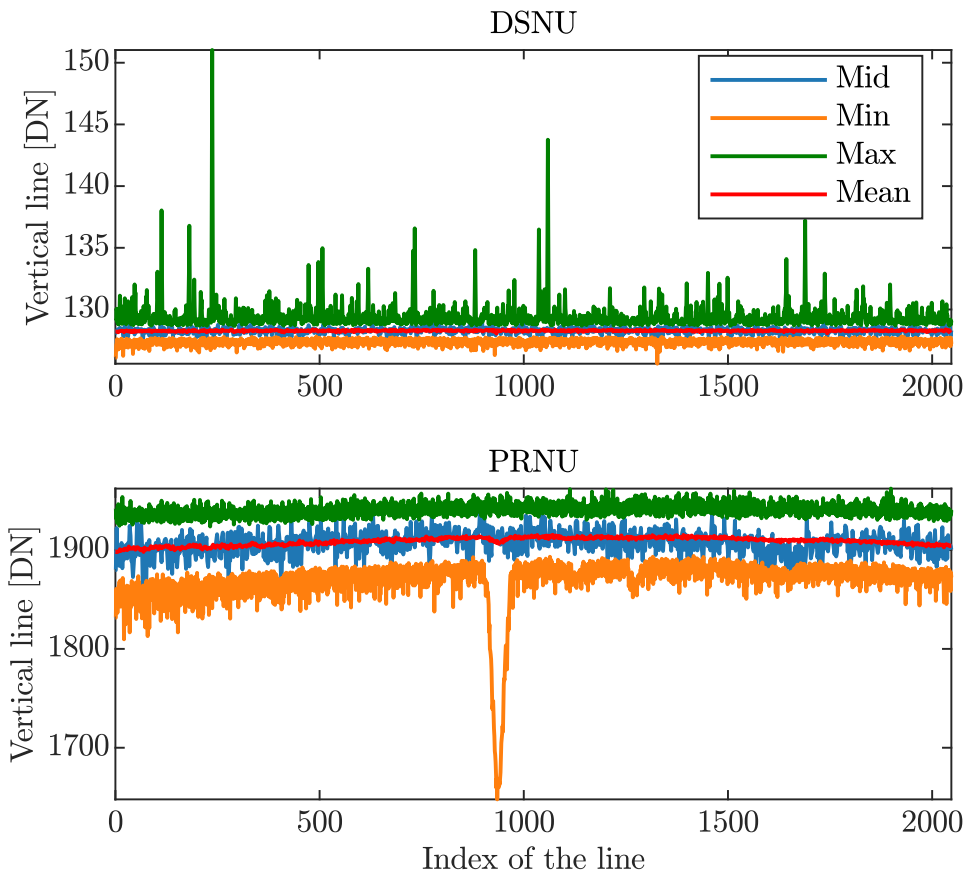
### Accumulated Log Histogram PRNU



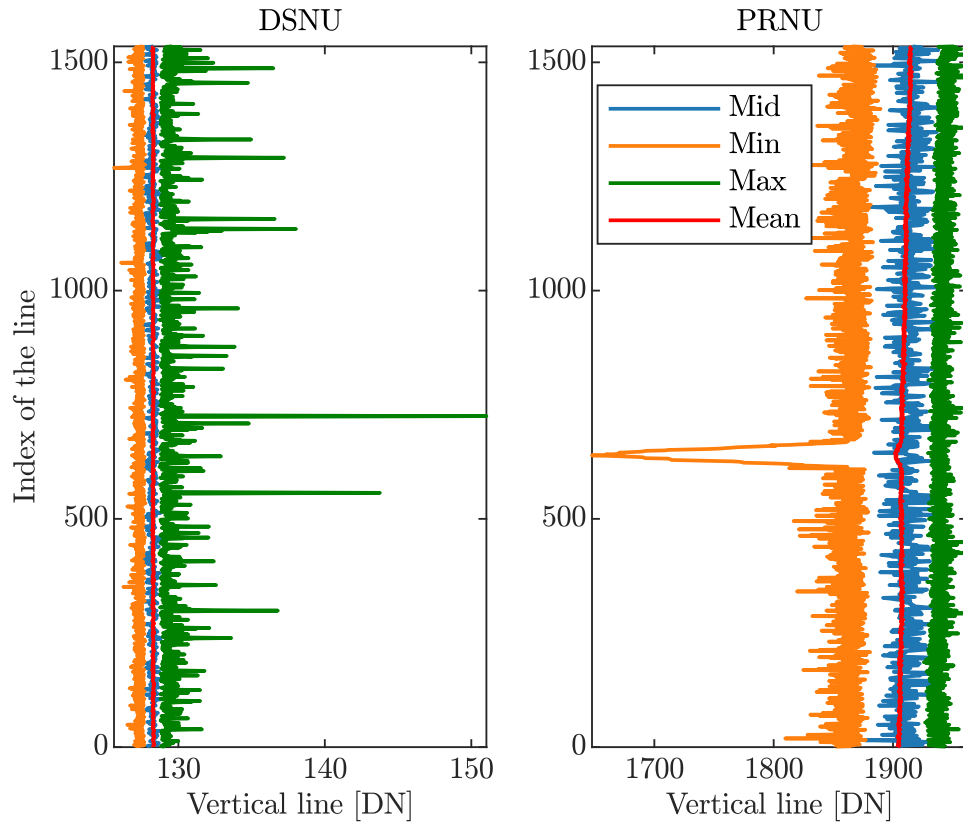
### Accumulated Log Histogram DSNU



### Horizontal Profile



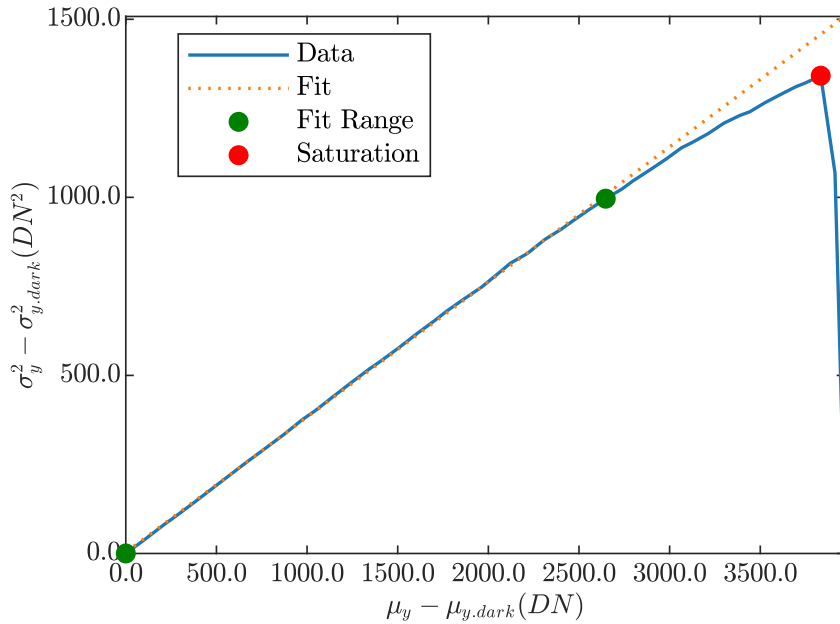
### Vertical Profile



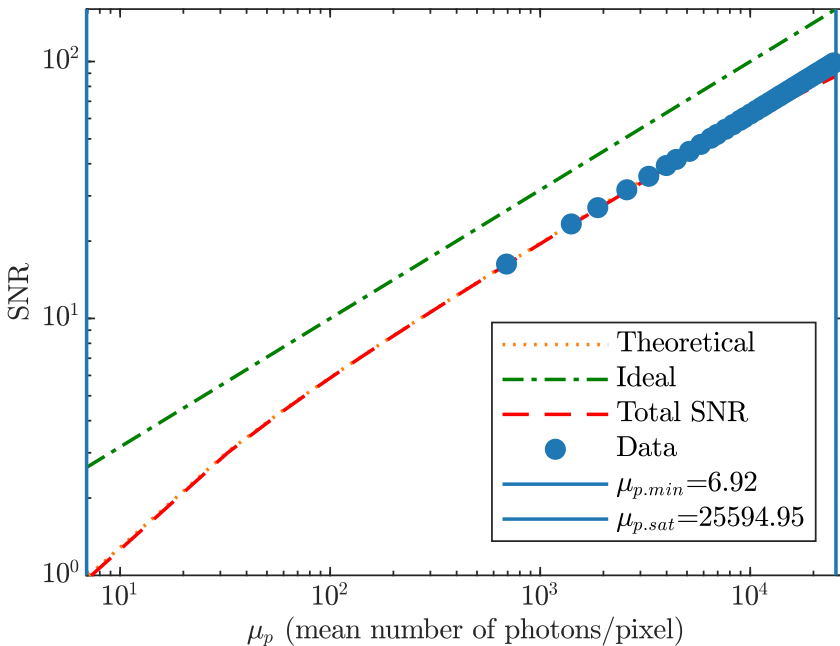
Summary Sheet for Operation Point 3 at a Wavelength of 448 nm

| Camera setting |             | Operation point parameters |        |
|----------------|-------------|----------------------------|--------|
| Gain           | GainLevelx1 | Environmental temperature  | 24.43  |
| Black level    | 128         | Camera body temperature    | 33.81  |
|                |             | Sensor temperature         | 44.152 |
|                |             | Processor temperature      | 42     |

Photon Transfer

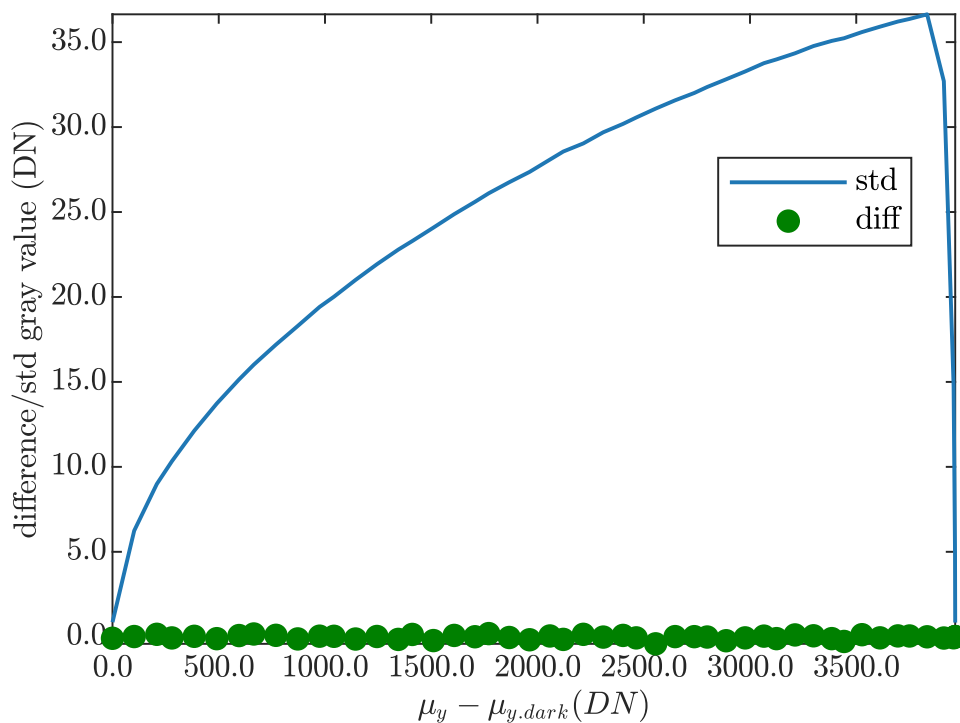


Signal-to-Noise Ratio

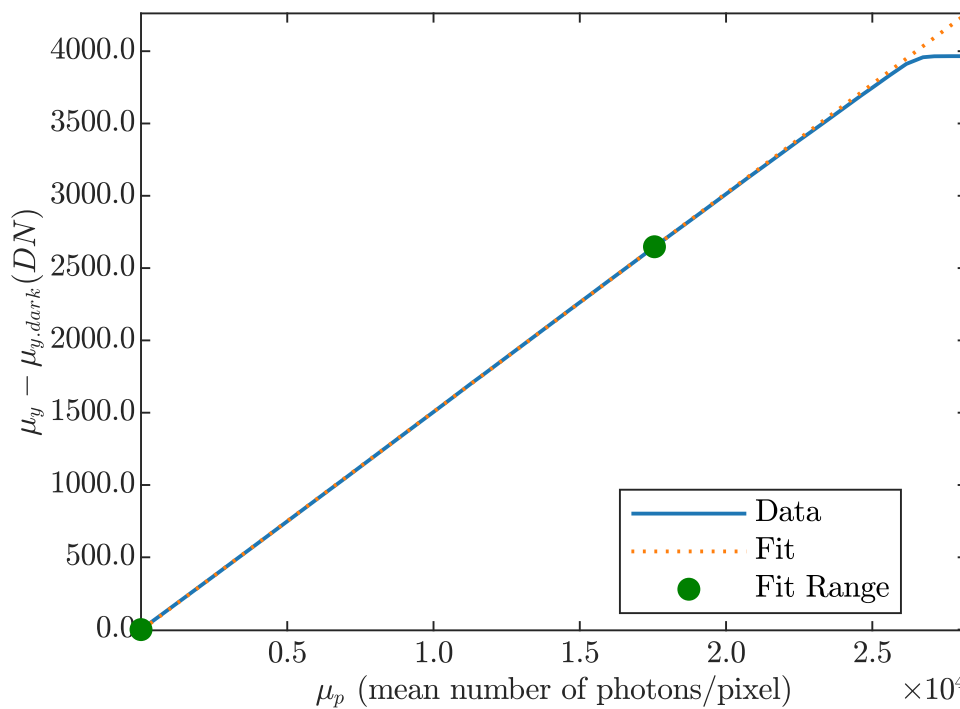


| Performance                           |   |
|---------------------------------------|---|
| <b>Quantum efficiency</b>             |   |
| $\eta$                                | 39.0194 %                               |
| <b>System gain</b>                    |   |
| K                                     | 0.38533 DN/e <sup>-</sup>               |
| 1/K                                   | 2.5952 e <sup>-</sup> /DN               |
| <b>Temporal dark noise</b>            |   |
| $\sigma_d$                            | 2.0699 e <sup>-</sup>                   |
| $\sigma_{y,dark}$                     | 0.84824 DN                              |
| <b>Signal-to-noise ratio</b>          |   |
| SNR <sub>max</sub>                    | 99.9349                                 |
|                                       | 39.9943 dB                              |
|                                       | 6.6429 bit                              |
| 1/SNR <sub>max</sub>                  | 1.0007 %                                |
| <b>Absolute sensitivity threshold</b> |   |
| $\mu_{e,min}$                         | 2.7013 e <sup>-</sup>                   |
| $\mu_{e,min,area}$                    | 0.22696 e <sup>-</sup> /μm <sup>2</sup> |
| <b>Saturation capacity</b>            |   |
| $\mu_{e,sat}$                         | 9986.9836 e <sup>-</sup>                |
| $\mu_{e,sat,area}$                    | 839.066 e <sup>-</sup> /μm <sup>2</sup> |
| <b>Dynamic range</b>                  |   |
| DR                                    | 3697.0579                               |
|                                       | 71.3571 dB                              |
|                                       | 11.8522 bit                             |
| <b>Spatial nonuniformities</b>        |   |
| DSNU <sub>1288</sub>                  | 0.58341 e <sup>-</sup>                  |
| DSNU <sub>1288,col</sub>              | 0.10732 e <sup>-</sup>                  |
| DSNU <sub>1288,row</sub>              | 0.077222 e <sup>-</sup>                 |
| DSNU <sub>1288,pix</sub>              | 0.56823 e <sup>-</sup>                  |
| PRNU <sub>1288</sub>                  | 0.54648 %                               |
| PRNU <sub>1288,col</sub>              | 0.045069 %                              |
| PRNU <sub>1288,row</sub>              | 0.034593 %                              |
| PRNU <sub>1288,pix</sub>              | 0.54352 %                               |
| <b>Linearity error</b>                |   |
| LE                                    | 0.00055748 %                            |
| <b>Dark current</b>                   |   |
| $\mu_{l,mean}$                        | 14.3787 e <sup>-</sup> /s               |
| $\mu_{l,var}$                         | 0.80389 e <sup>-</sup> /s               |

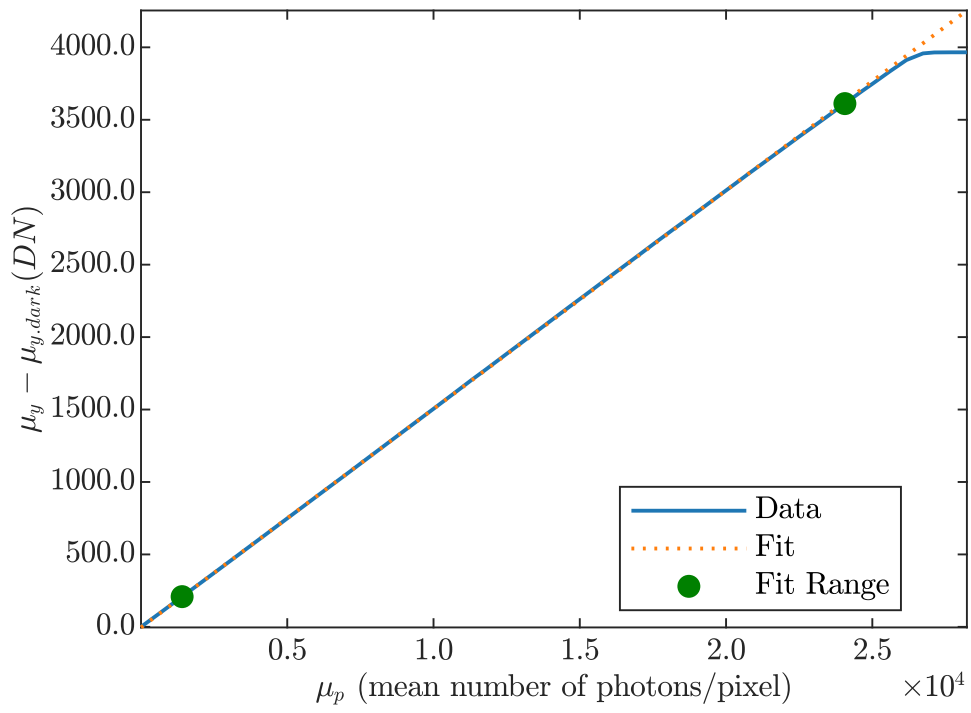
### Stability check



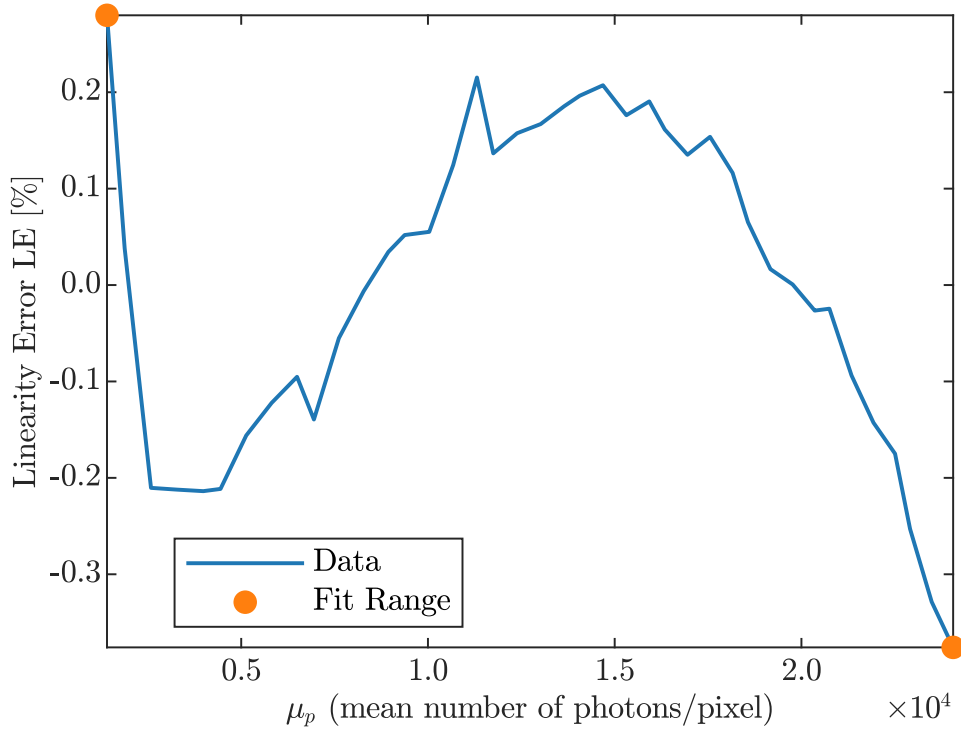
### Sensitivity



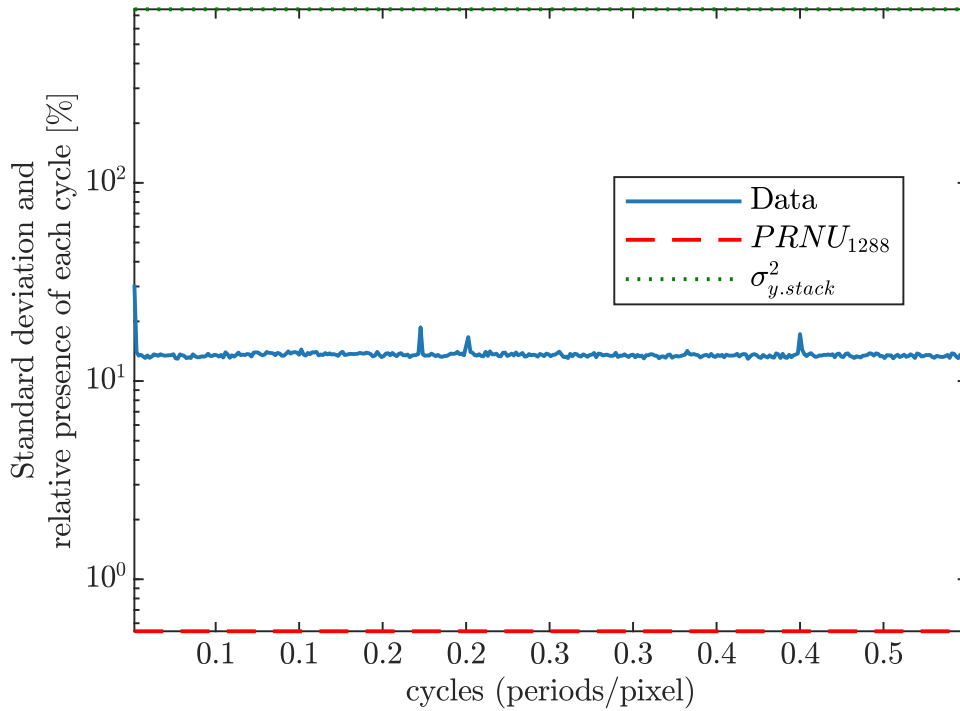
### Linearity



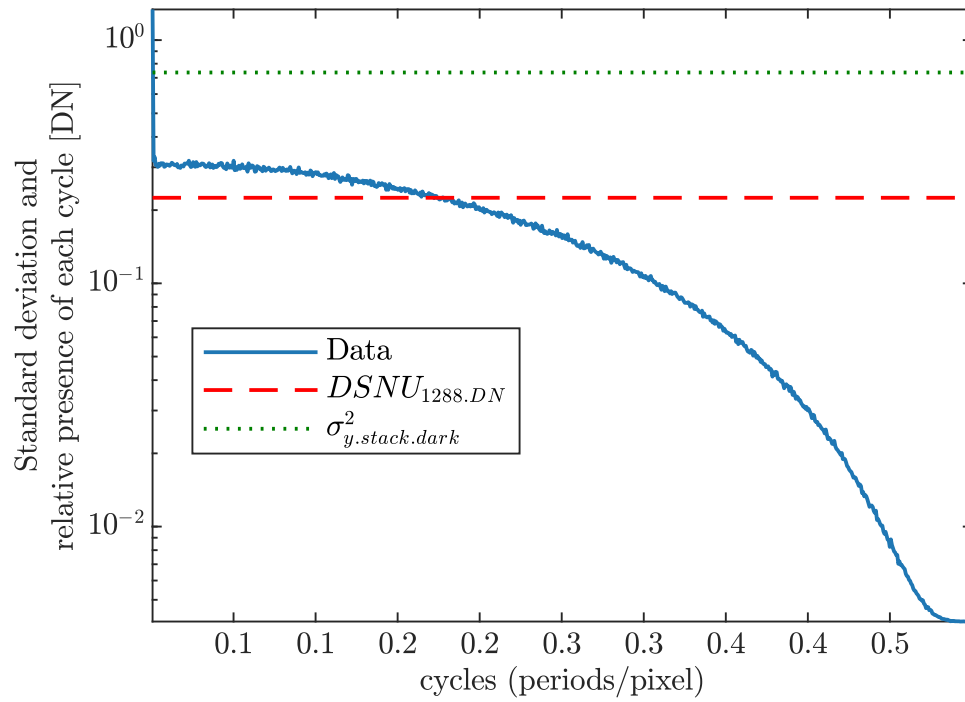
### Deviation Linearity



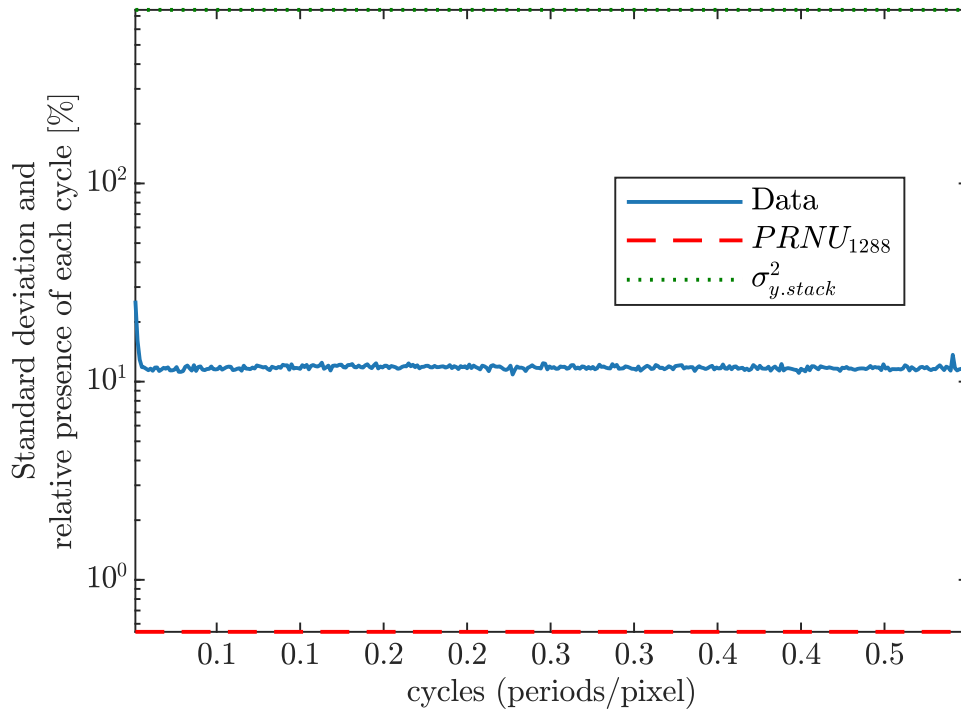
### Horizontal Spectrogram PRNU



### Horizontal Spectrogram DSNU

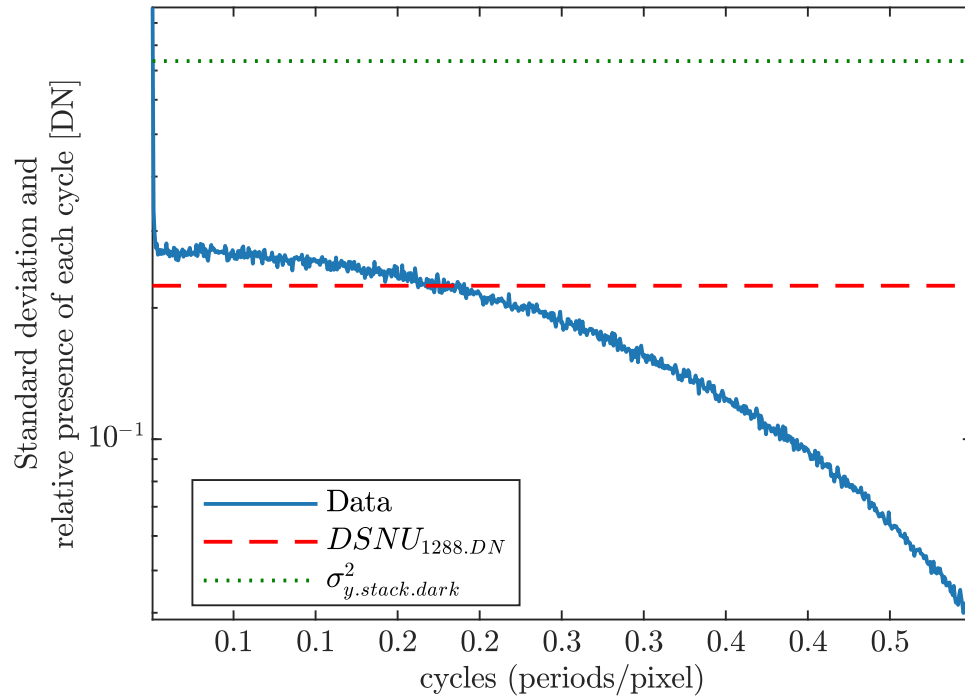


### Vertical Spectrogram PRNU

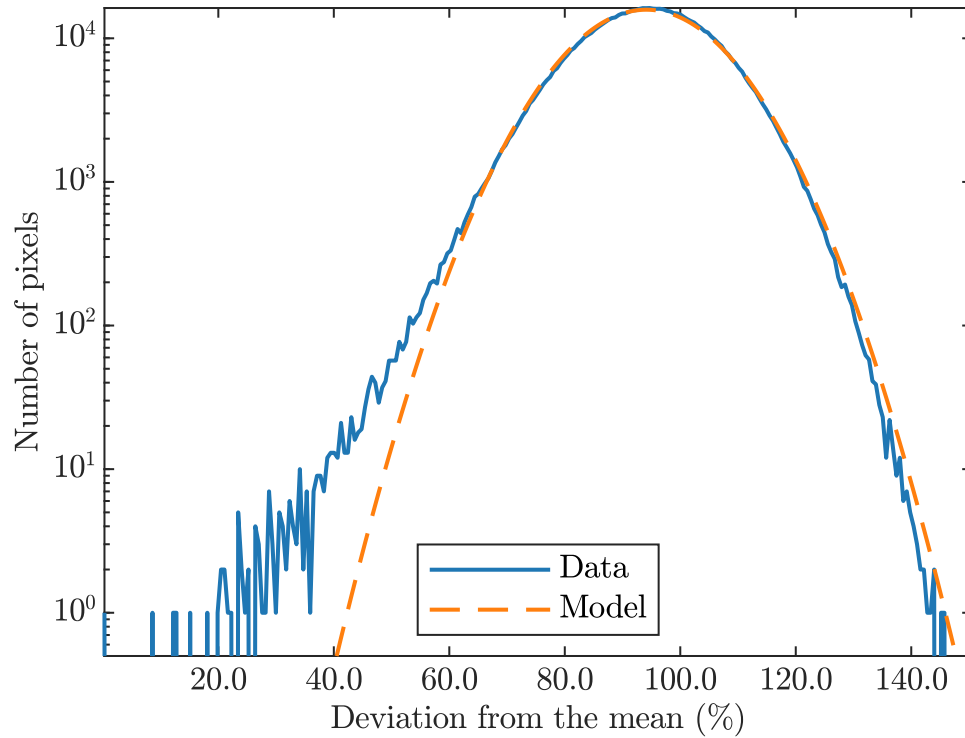




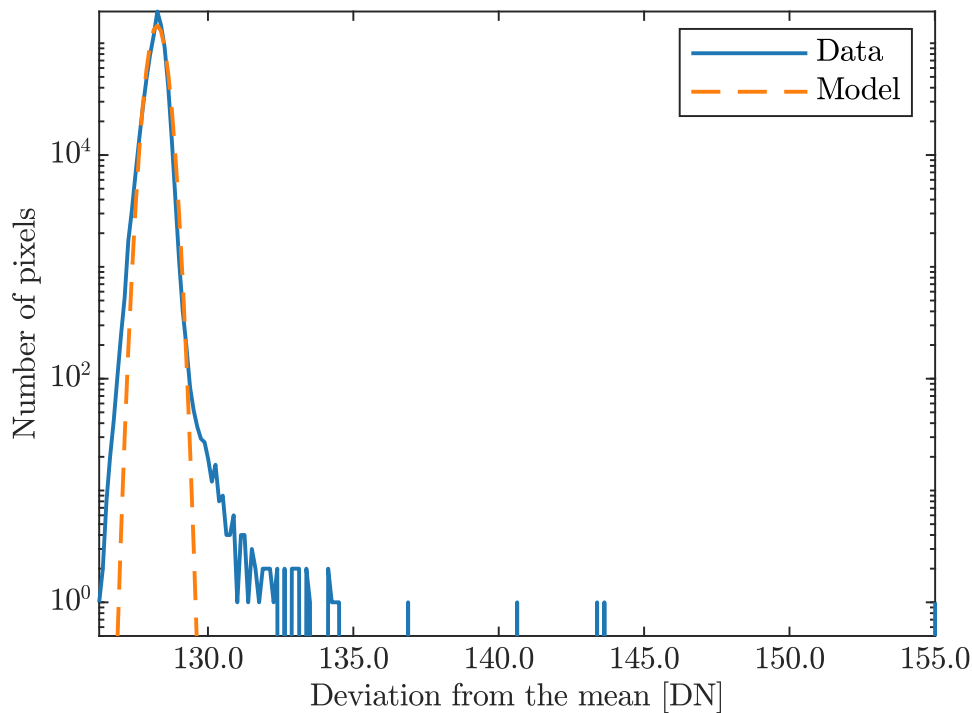
### Vertical Spectrogram DSNU



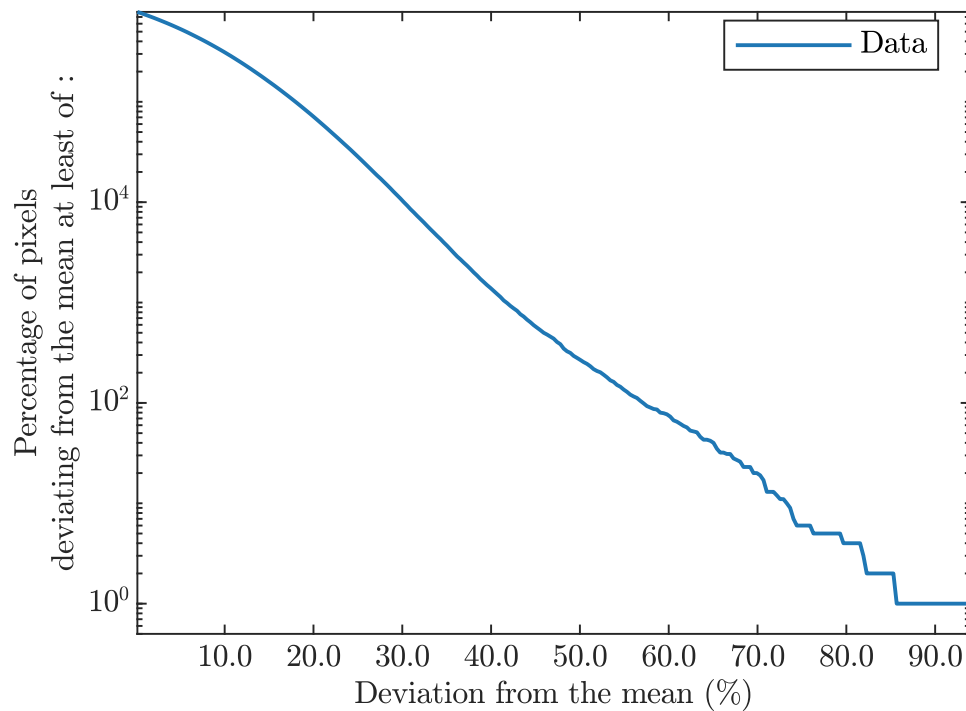
### Logarithmic Histogram PRNU



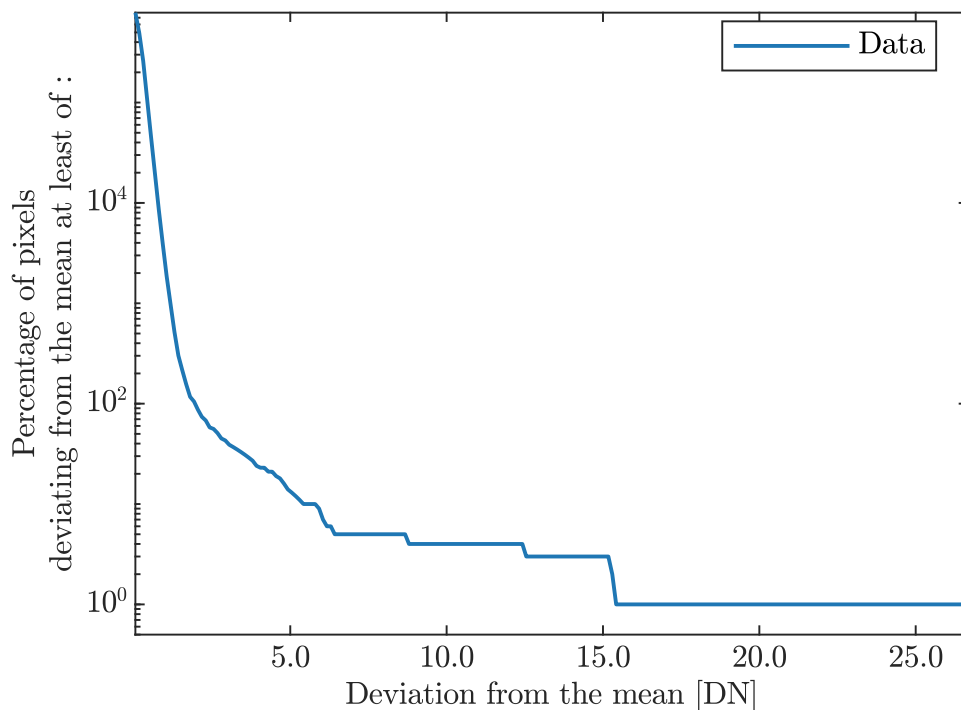
### Logarithmic Histogram DSNU



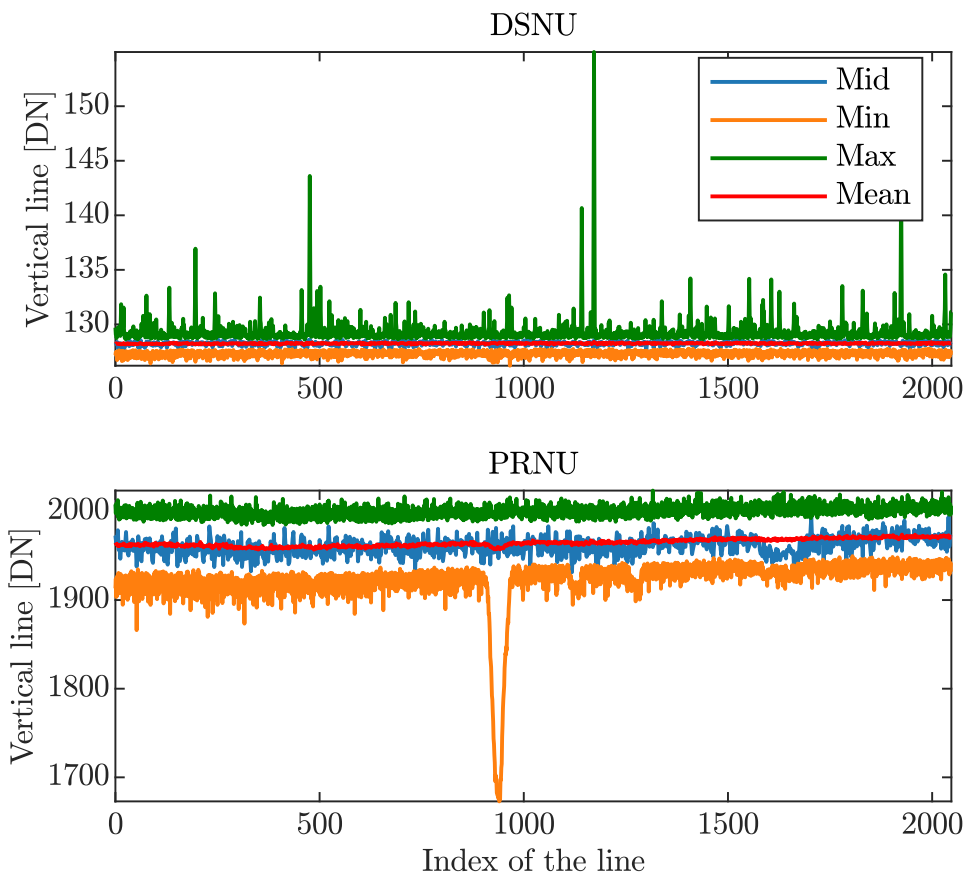
### Accumulated Log Histogram PRNU



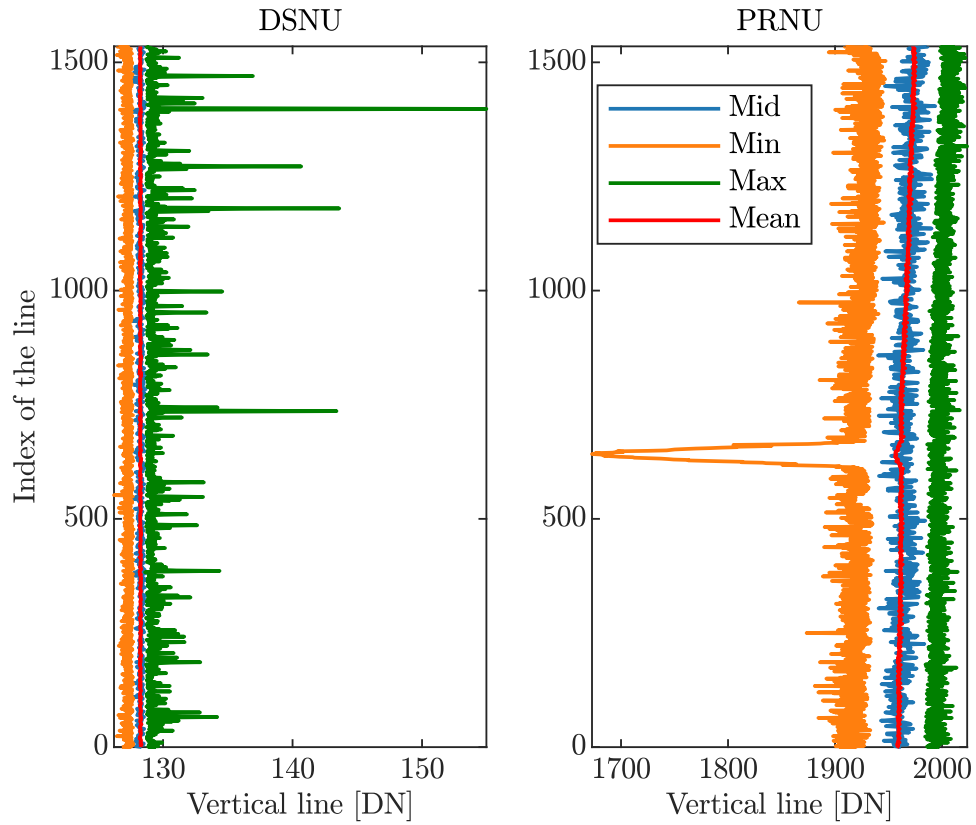
### Accumulated Log Histogram DSNU



### Horizontal Profile

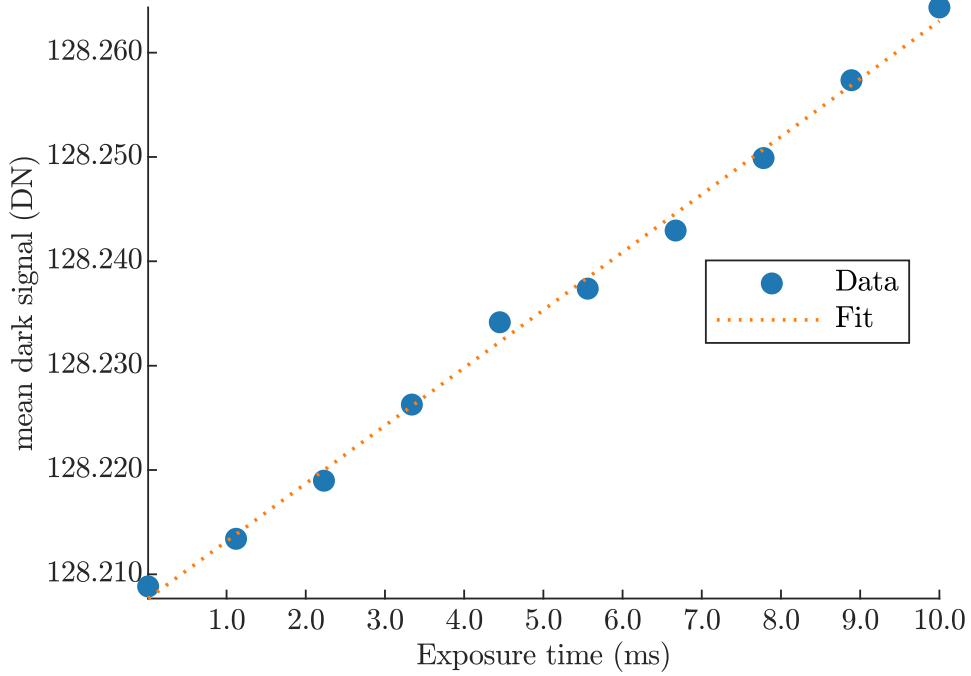


### Vertical Profile

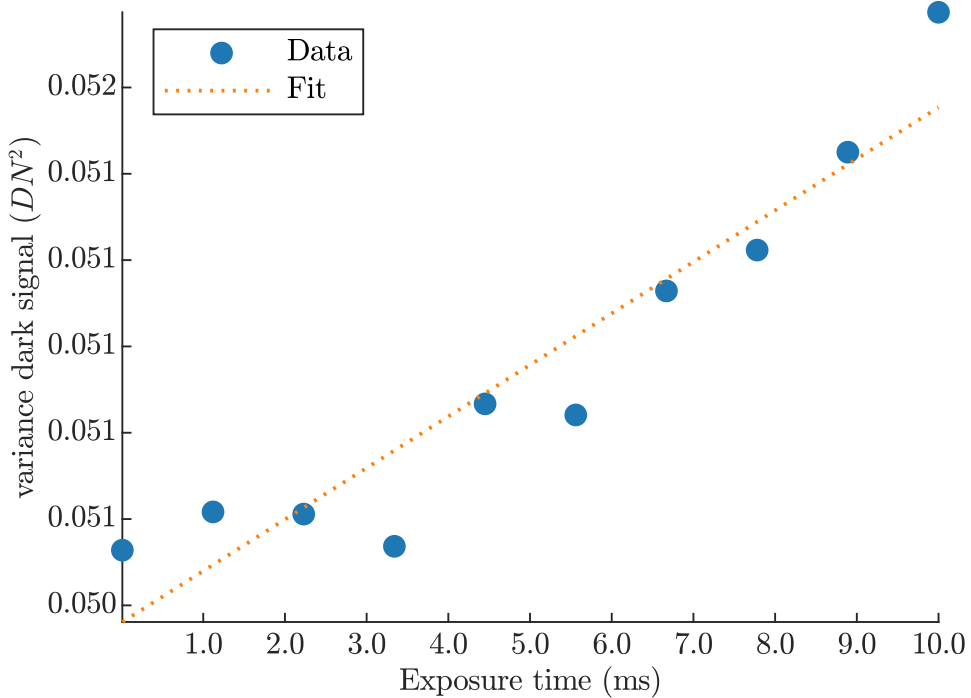


### Dark Current

#### Dark Current from Mean



#### Dark Current from Variance



International Distributor



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