

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).

Vendor	KAYA Instruments	Sensor	IMX252
Model	Iron252C	Sensor type	CMOS
Camera type	Color	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	6000 μ s
Pixel size	3.45 μ m x 3.45 μ 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	2020055	Standart version	3.1
Firmware version	3.1-2020.4.13	Light source	Integrating Sphere
Sensor diagonal	16.1mm		

International Distributors



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

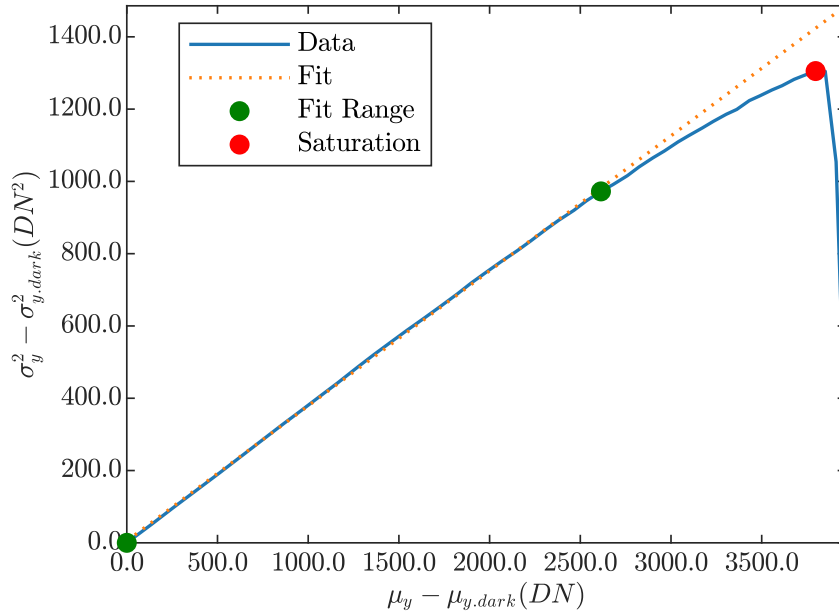
Camera setting

Gain	GainLevelx1
Black level	128

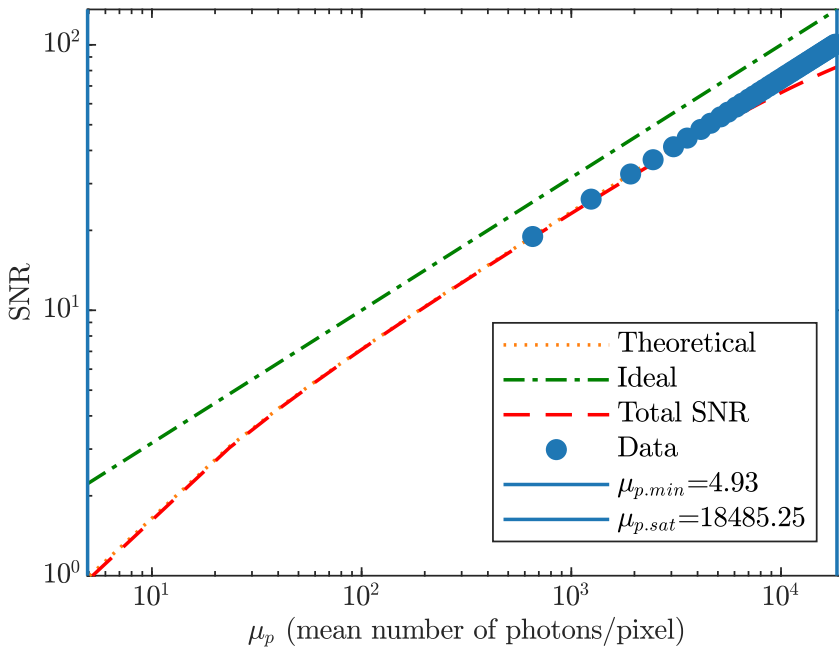
Operation point parameters

Environmental temperature	2.93
Camera body temperature	2.93
Sensor temperature	40.808
Processor temperature	37

Photon Transfer



Signal-to-Noise Ratio



Performance

Quantum efficiency

η	55.723	%
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System gain

K	0.37359	DN/e ⁻
1/K	2.6767	e ⁻ /DN

Temporal dark noise

σ_d	2.1131	e ⁻
$\sigma_{y,dark}$	0.84054	DN

Signal-to-noise ratio

SNR _{max}	101.4915	
	40.1286	dB
	6.6652	bit
1/SNR _{max}	0.9853	%

Absolute sensitivity threshold

$\mu_{p,min}$	4.935	p
$\mu_{p,min,area}$	0.41462	p/μm ²
$\mu_{e,min}$	2.7499	e ⁻
$\mu_{e,min,area}$	0.23104	e ⁻ /μm ²

Saturation capacity

$\mu_{p,sat}$	18485.2503	p
$\mu_{p,sat,area}$	1553.0561	p/μm ²
$\mu_{e,sat}$	10300.5306	e ⁻
$\mu_{e,sat,area}$	865.409	e ⁻ /μm ²

Dynamic range

DR	3745.7516	
	71.4708	dB
	11.871	bit

Spatial nonuniformities

DSNU ₁₂₈₈	0.61892	e ⁻
	0.23122	DN
PRNU ₁₂₈₈	0.70456	%

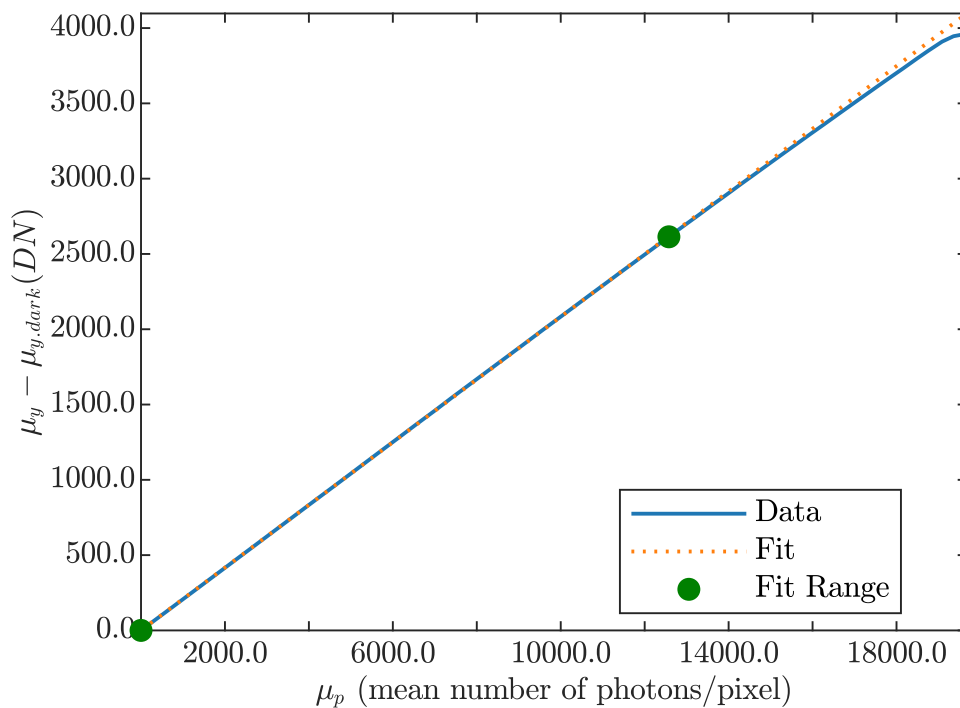
Linearity error

LE _{min}	-0.80632	%
LE _{max}	0.44676	%

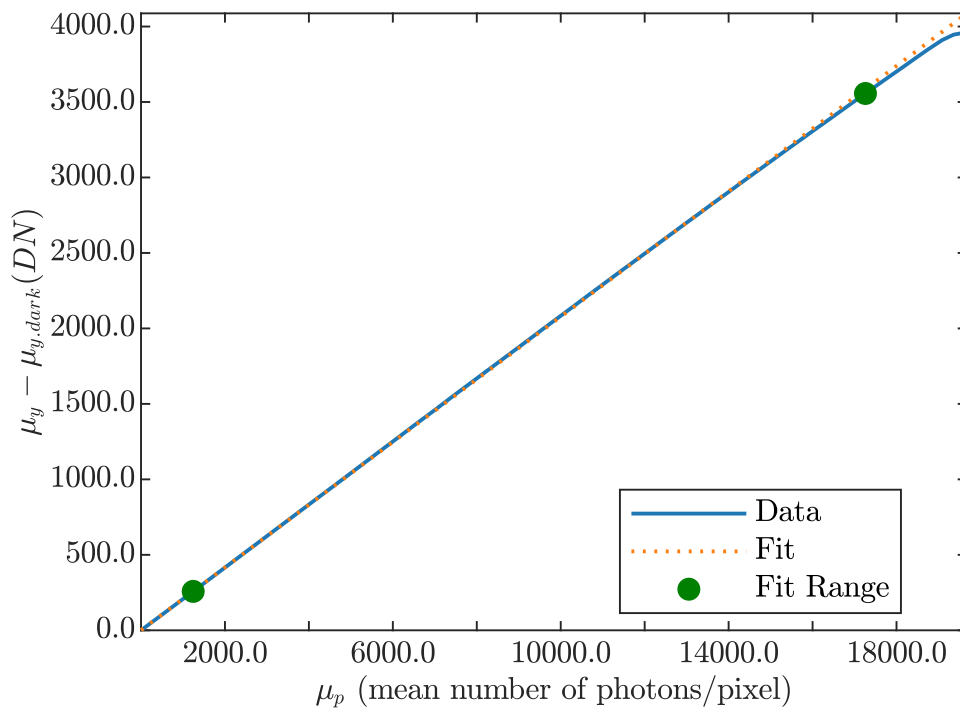
Dark current

$\mu_{l,mean}$	12.2311	e ⁻ /s
	4.6466	DN/s
$\mu_{l,var}$	0.64742	e ⁻ /s
	0.09344	DN/s

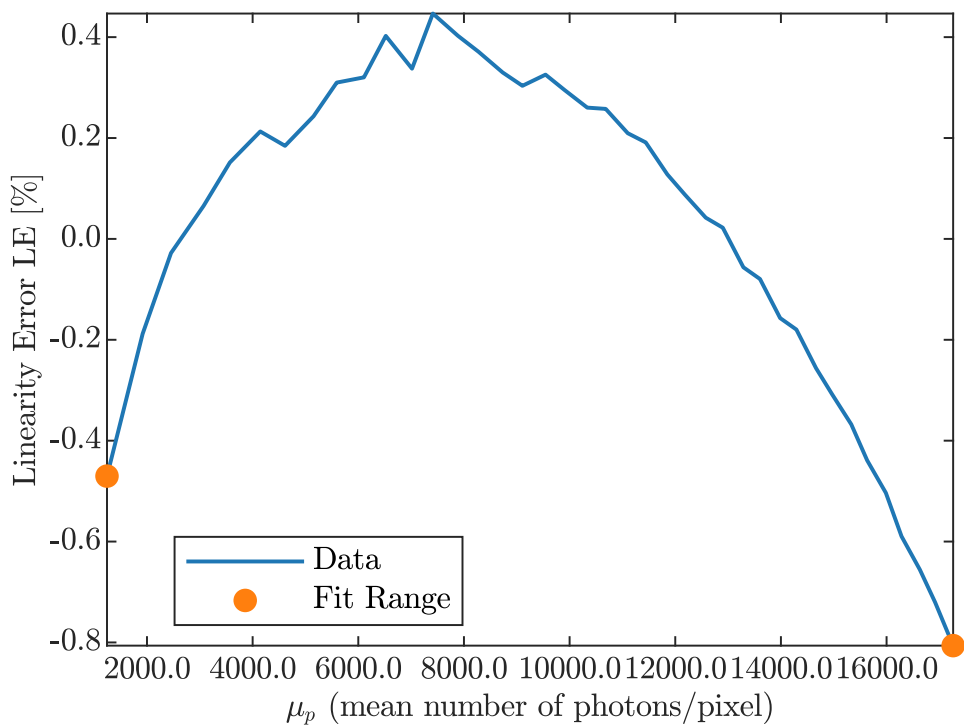
Sensitivity



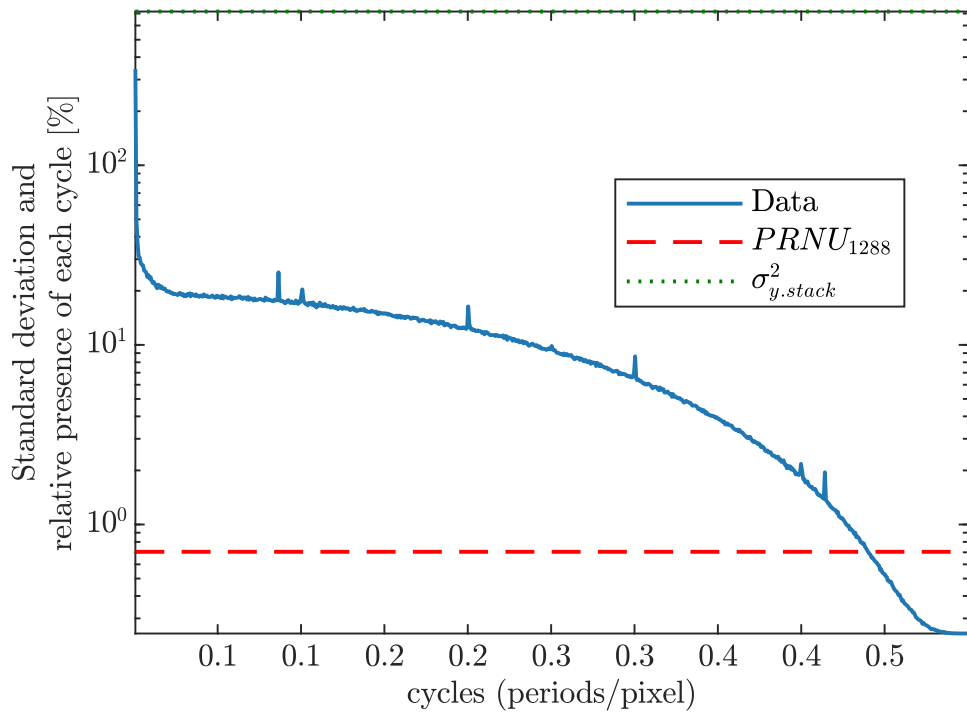
Linearity



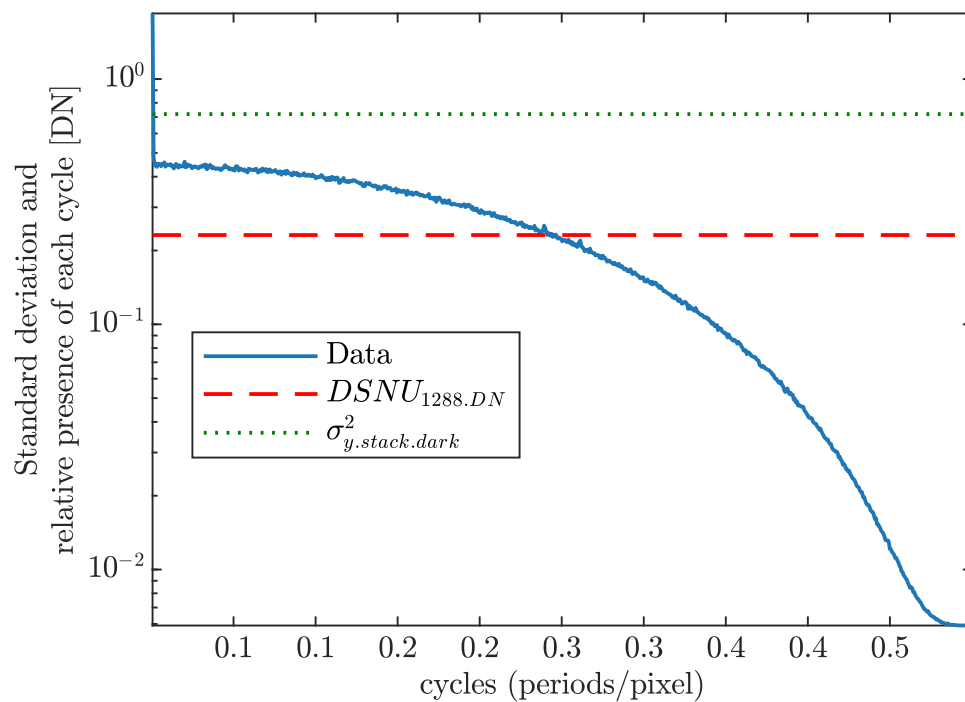
Deviation Linearity



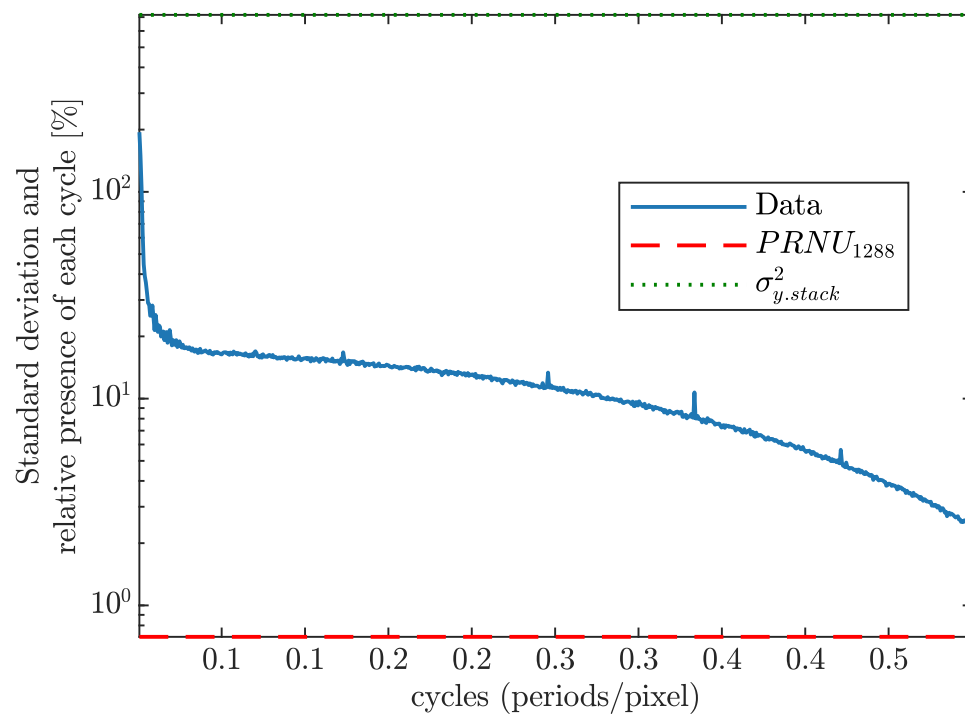
Horizontal Spectrogram PRNU



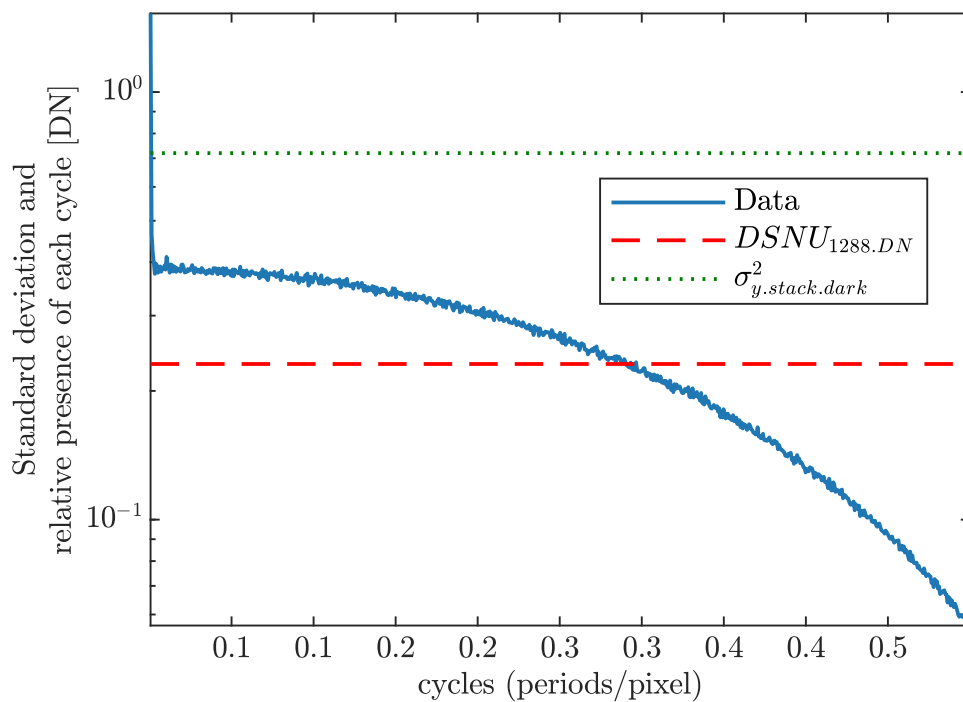
Horizontal Spectrogram DSNU



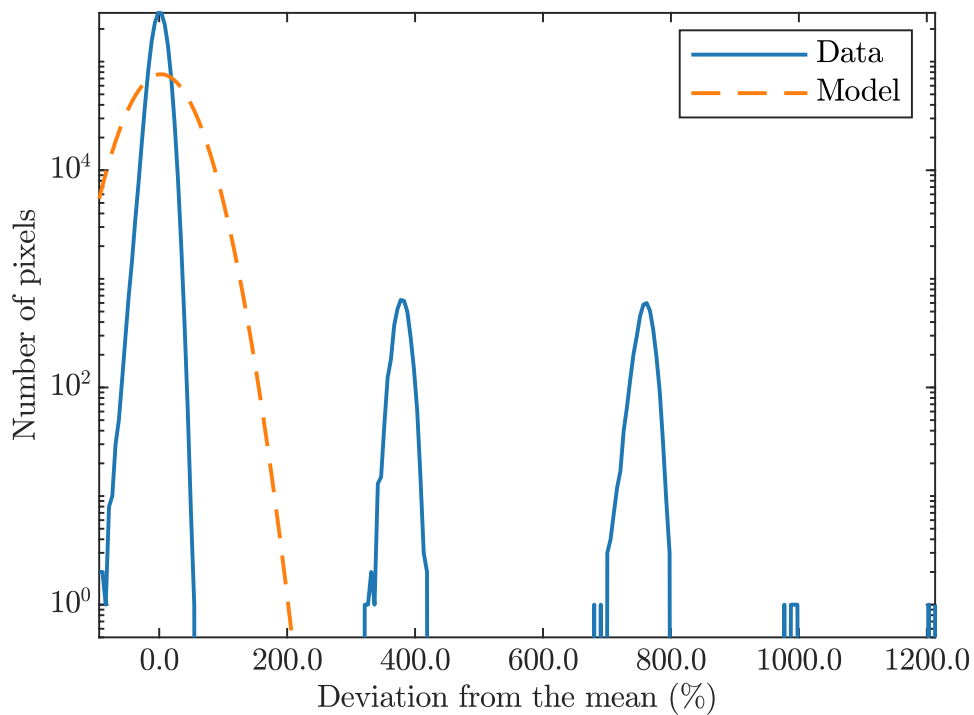
Vertical Spectrogram PRNU



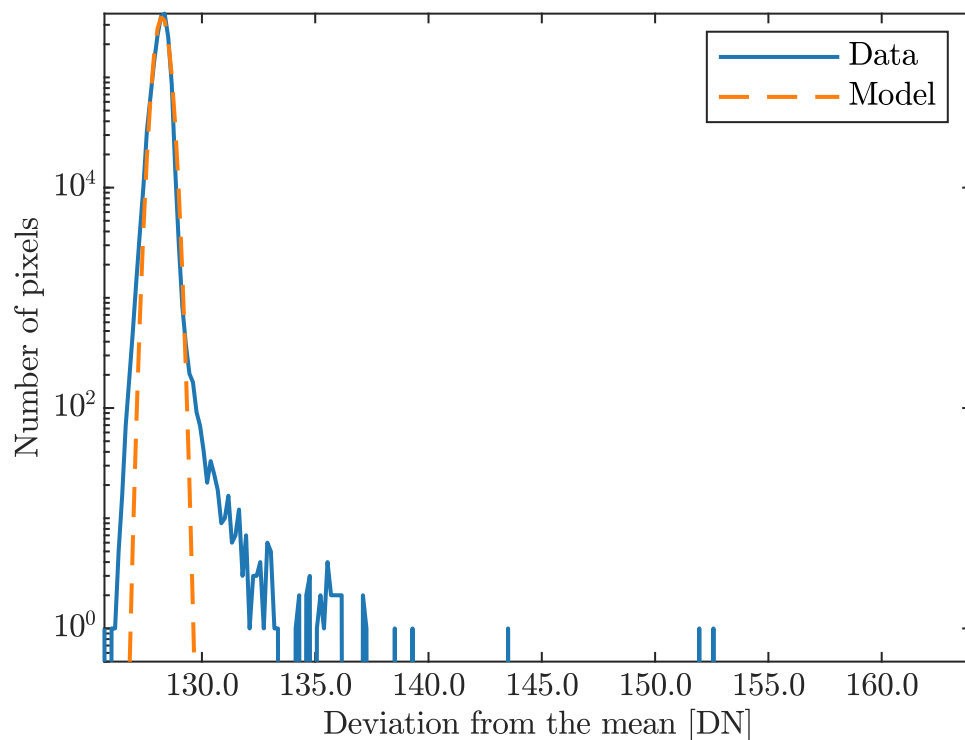
Vertical Spectrogram DSNU



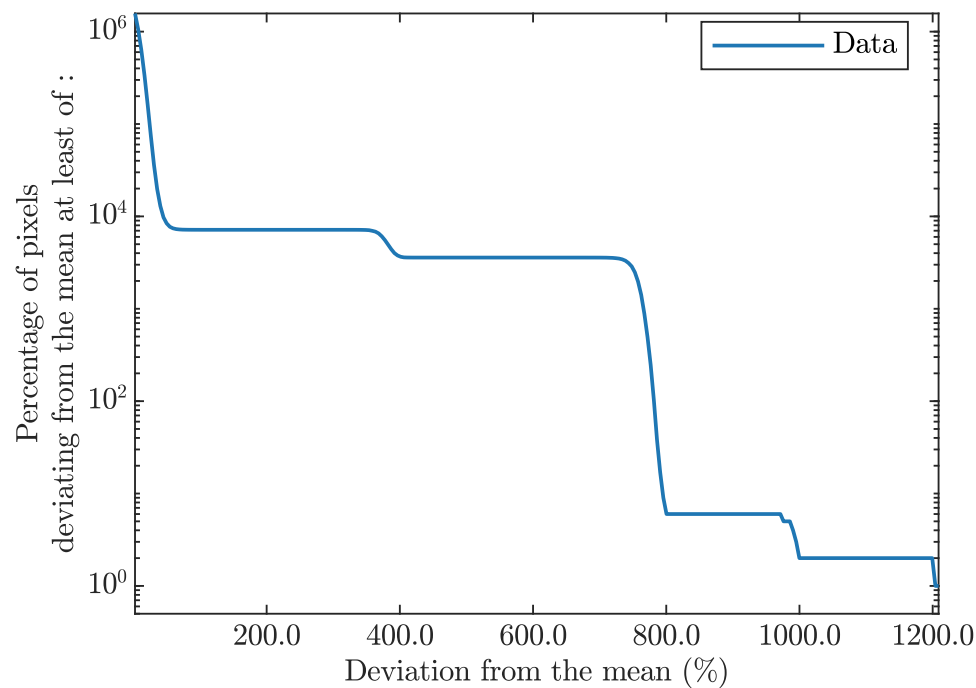
Logarithmic Histogram PRNU



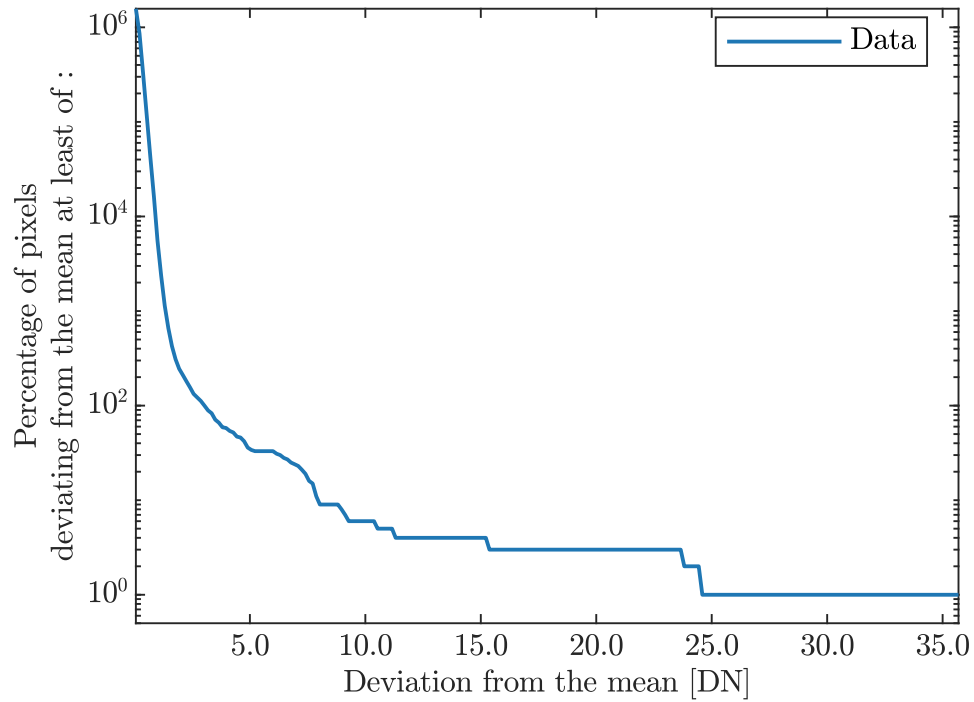
Logarithmic Histogram DSNU



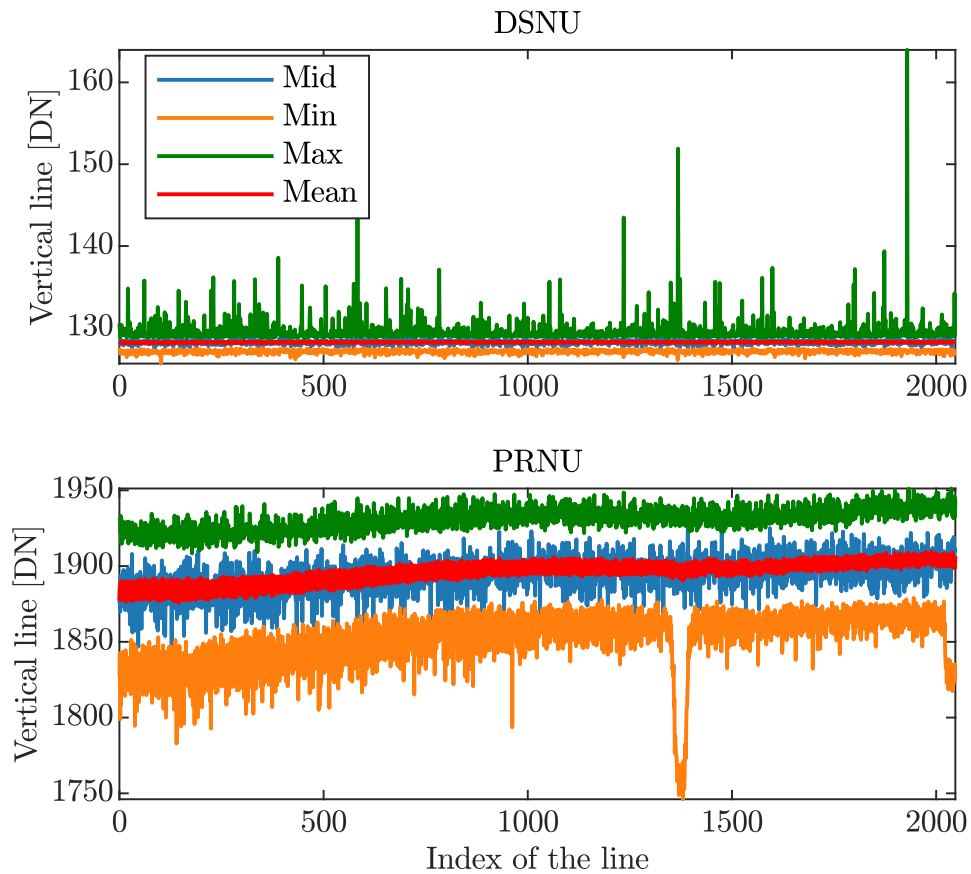
Accumulated Log Histogram PRNU



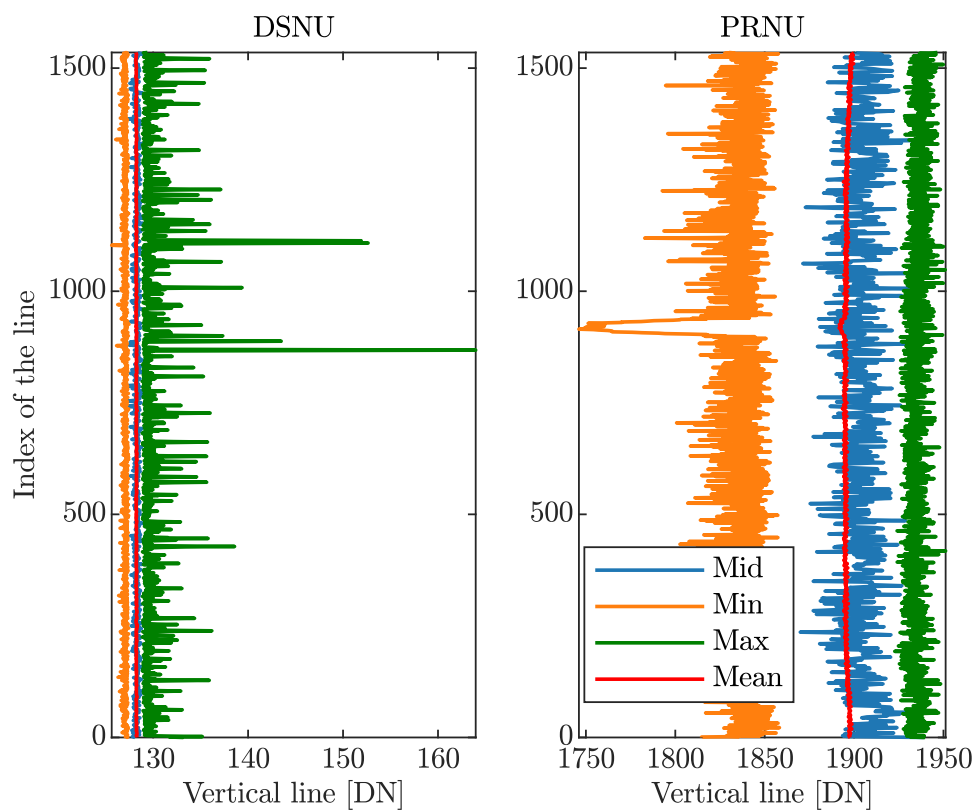
Accumulated Log Histogram DSNU



Horizontal Profile



Vertical Profile



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

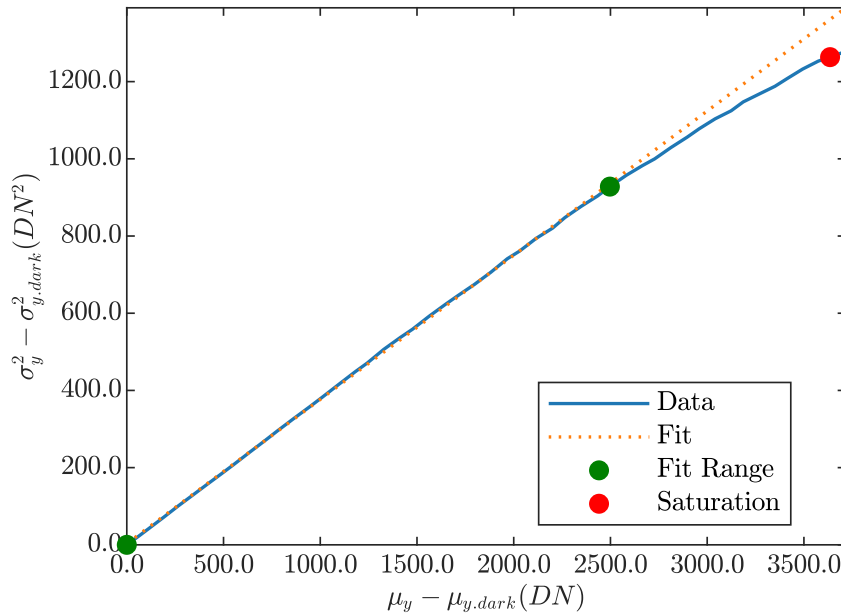
Camera setting

Gain	GainLevelx1
Black level	128

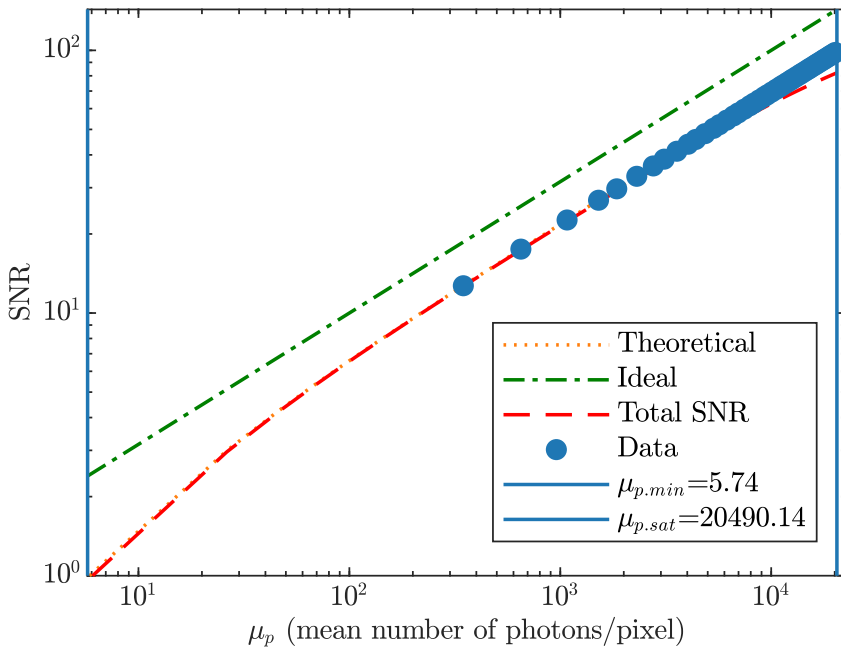
Operation point parameters

Environmental temperature	2.81
Camera body temperature	2.81
Sensor temperature	40.808
Processor temperature	39

Photon Transfer



Signal-to-Noise Ratio



Performance

Quantum efficiency

η	47.9083	%
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System gain

K	0.37354	DN/e ⁻
1/K	2.6771	e ⁻ /DN

Temporal dark noise

σ_d	2.1133	e ⁻
$\sigma_{y,dark}$	0.84054	DN

Signal-to-noise ratio

SNR _{max}	99.0781	
	39.9196	dB
	6.6305	bit
1/SNR _{max}	1.0093	%

Absolute sensitivity threshold

$\mu_{p,min}$	5.7405	p
$\mu_{p,min,area}$	0.4823	p/ μm^2
$\mu_{e,min}$	2.7502	e ⁻
$\mu_{e,min,area}$	0.23106	e ⁻ / μm^2

Saturation capacity

$\mu_{p,sat}$	20490.1352	p
$\mu_{p,sat,area}$	1721.4984	p/ μm^2
$\mu_{e,sat}$	9816.4778	e ⁻
$\mu_{e,sat,area}$	824.7408	e ⁻ / μm^2

Dynamic range

DR	3569.388	
	71.0519	dB
	11.8015	bit

Spatial nonuniformities

DSNU ₁₂₈₈	0.62603	e ⁻
	0.23385	DN
PRNU ₁₂₈₈	0.68025	%

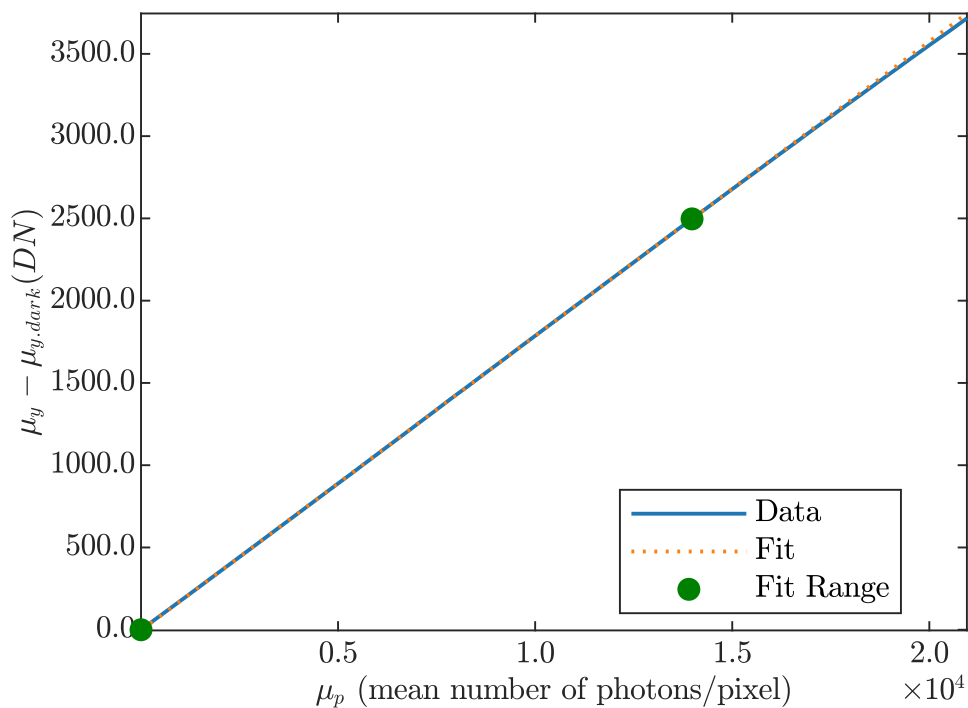
Linearity error

LE _{min}	-0.37516	%
LE _{max}	0.21934	%

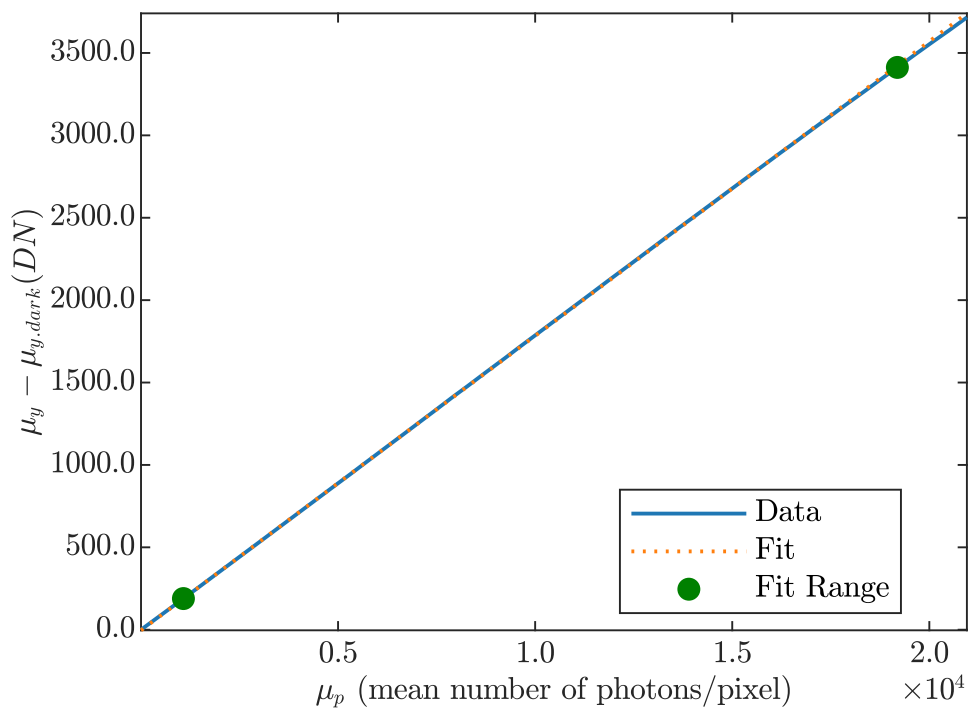
Dark current

$\mu_{l,mean}$	12.2311	e ⁻ /s
	4.6466	DN/s
$\mu_{l,var}$	0.64742	e ⁻ /s
	0.09344	DN/s

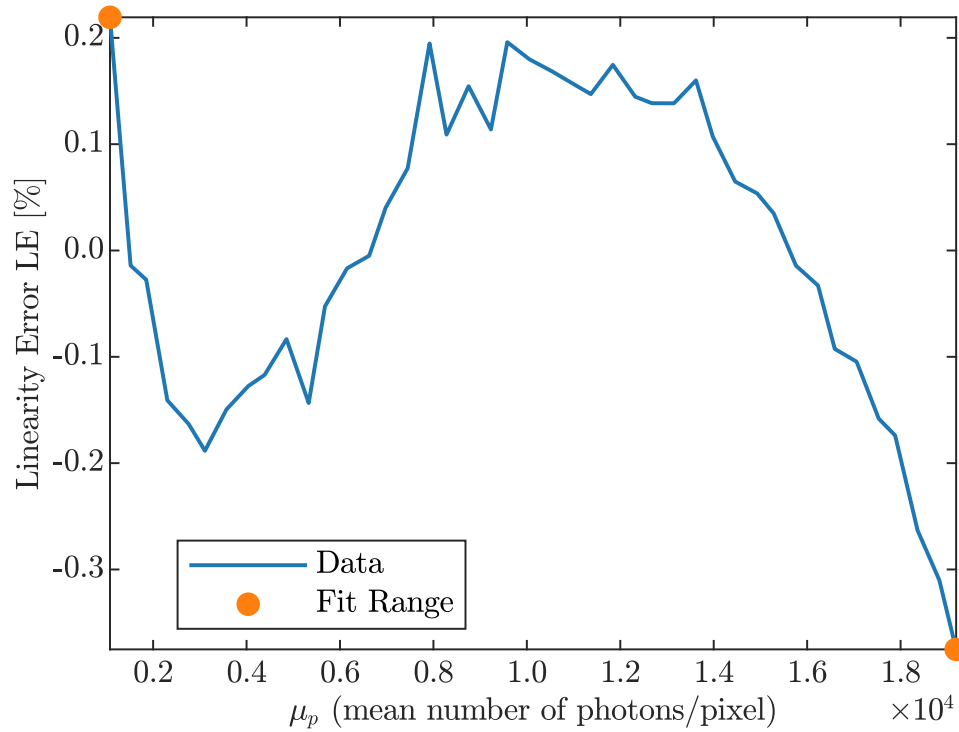
Sensitivity



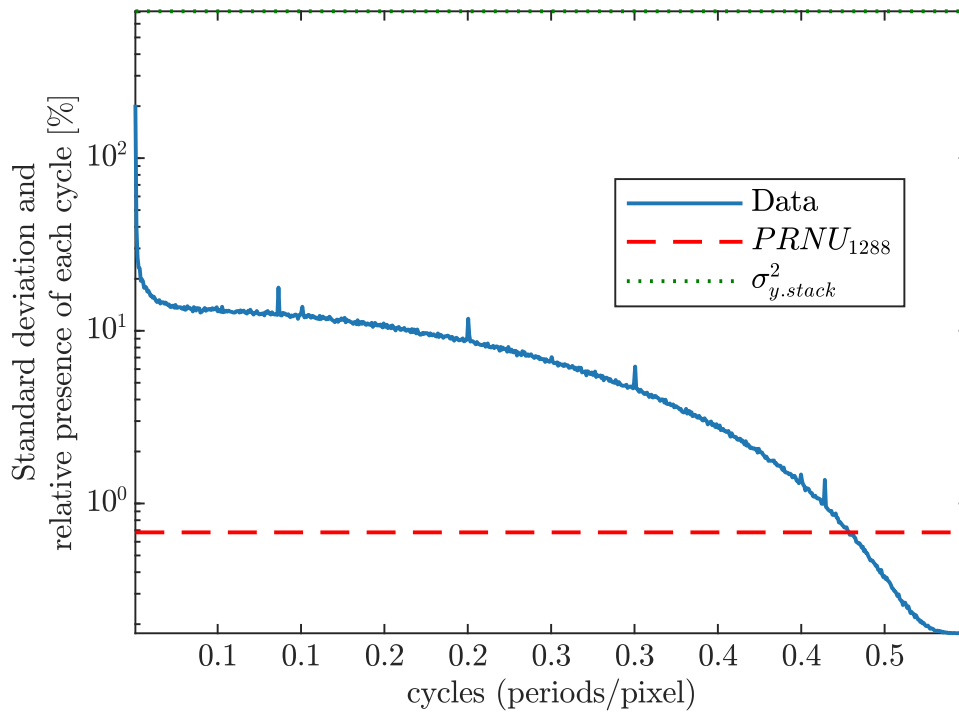
Linearity



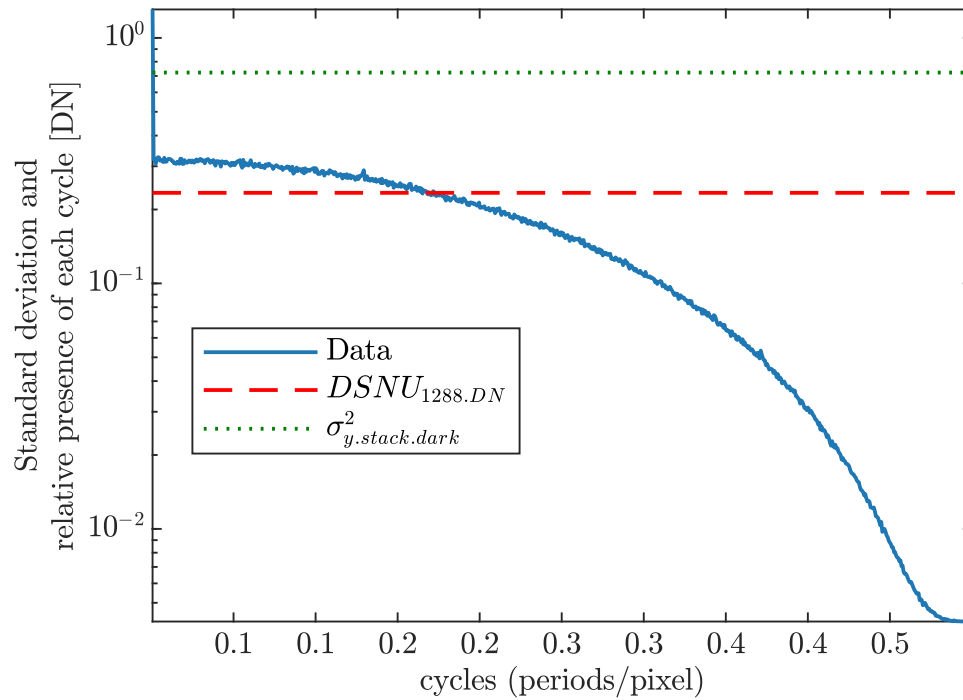
Deviation Linearity



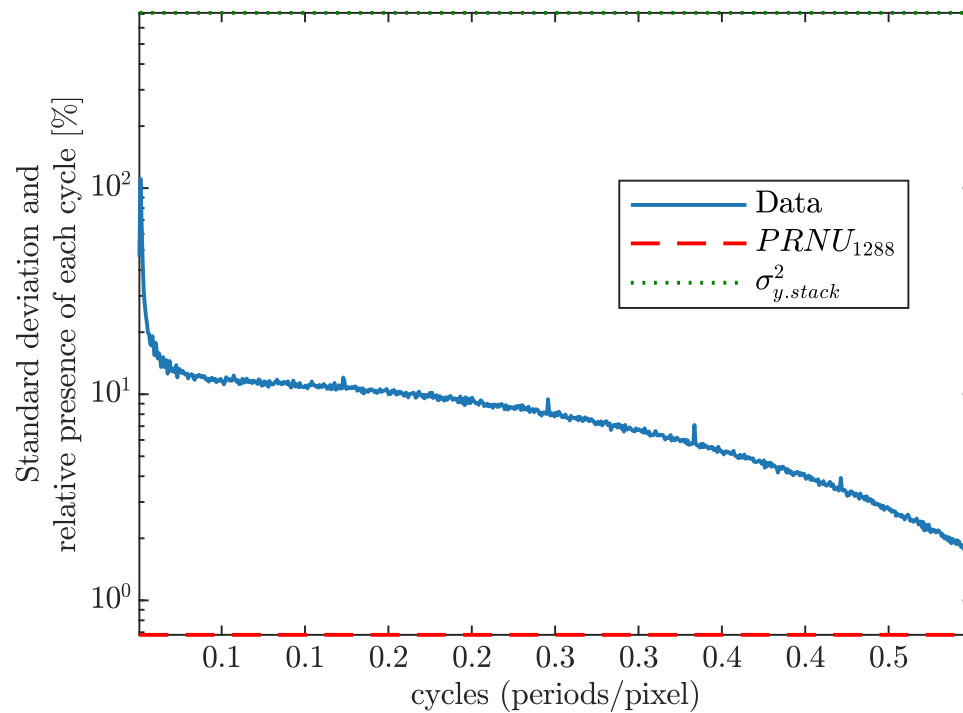
Horizontal Spectrogram PRNU



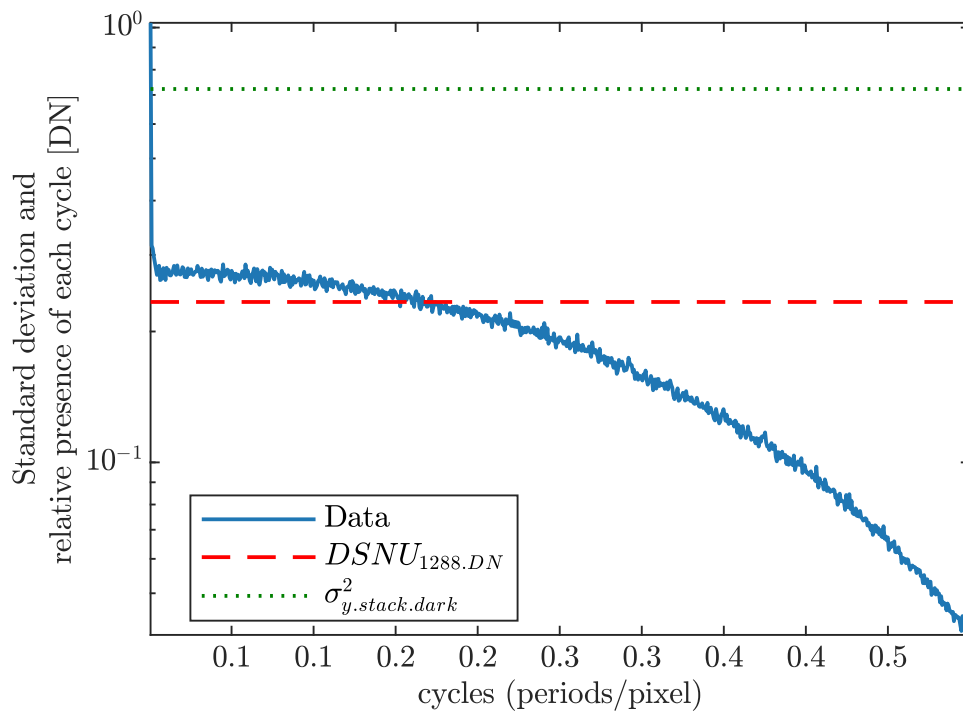
Horizontal Spectrogram DSNU



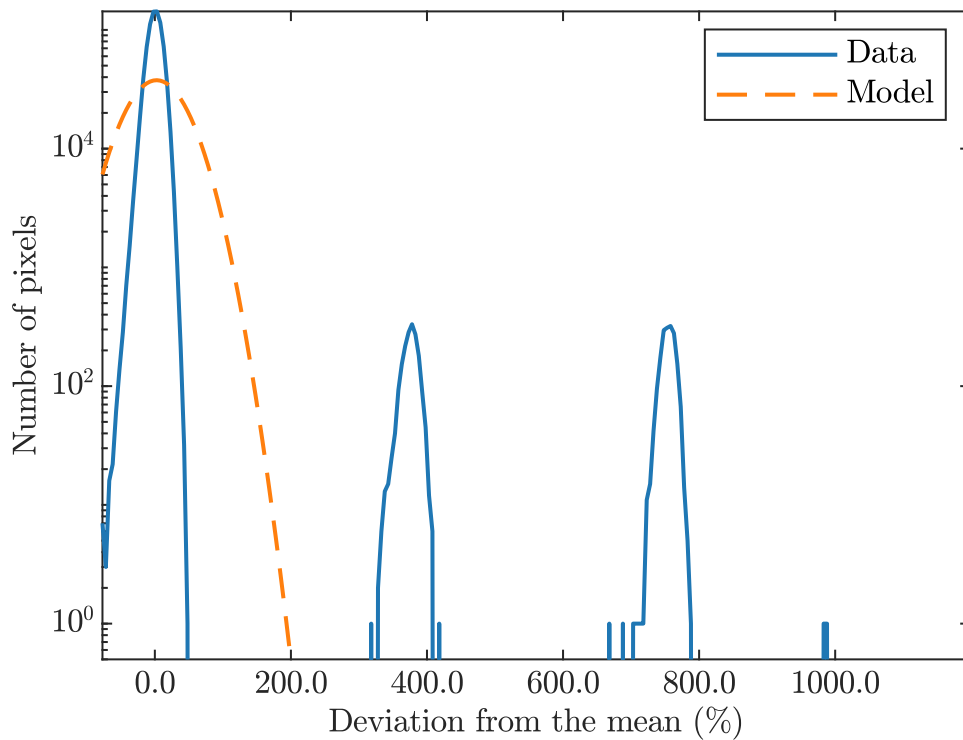
Vertical Spectrogram PRNU



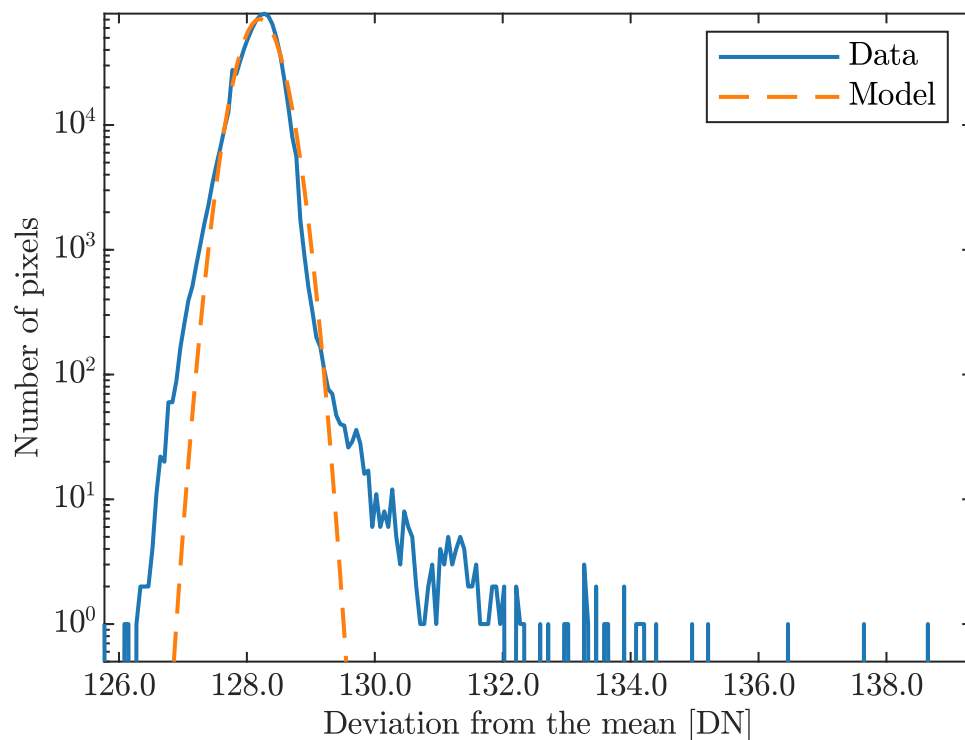
Vertical Spectrogram DSNU



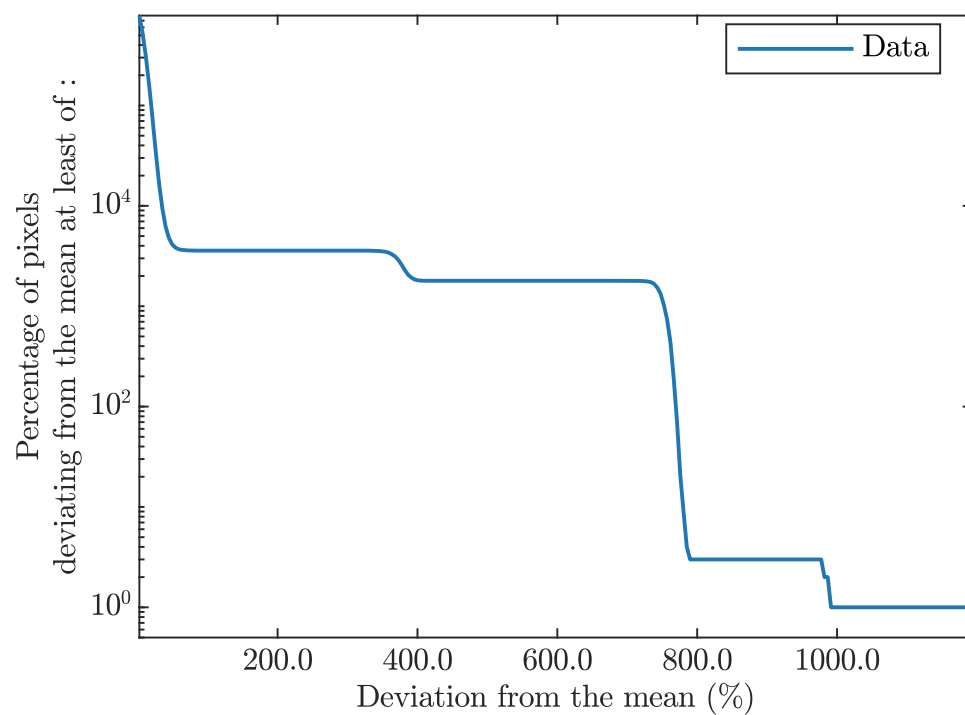
Logarithmic Histogram PRNU



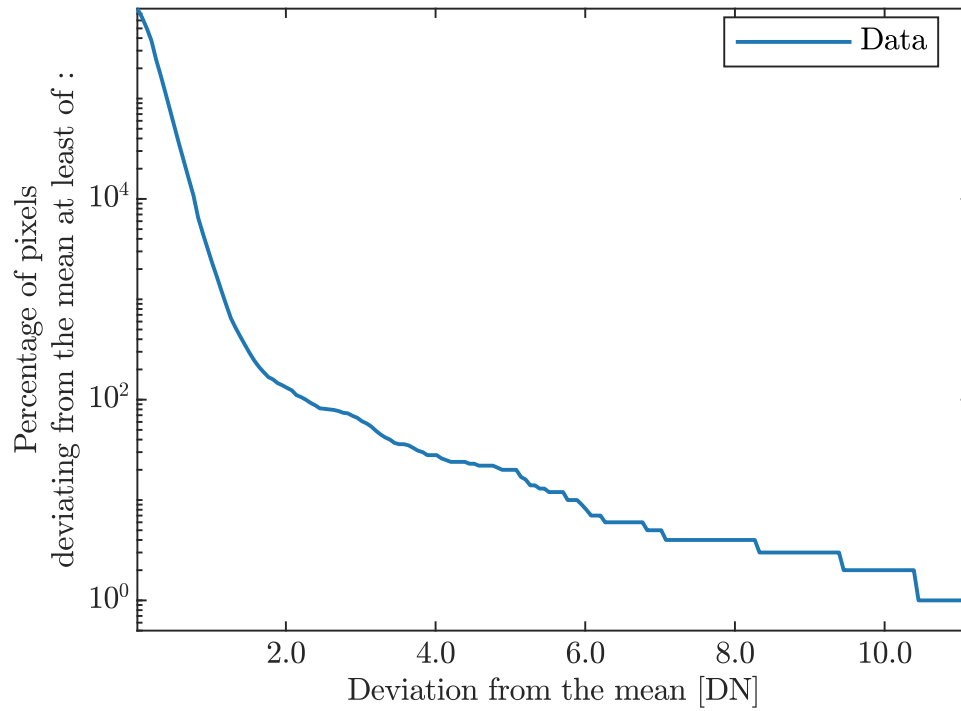
Logarithmic Histogram DSNU



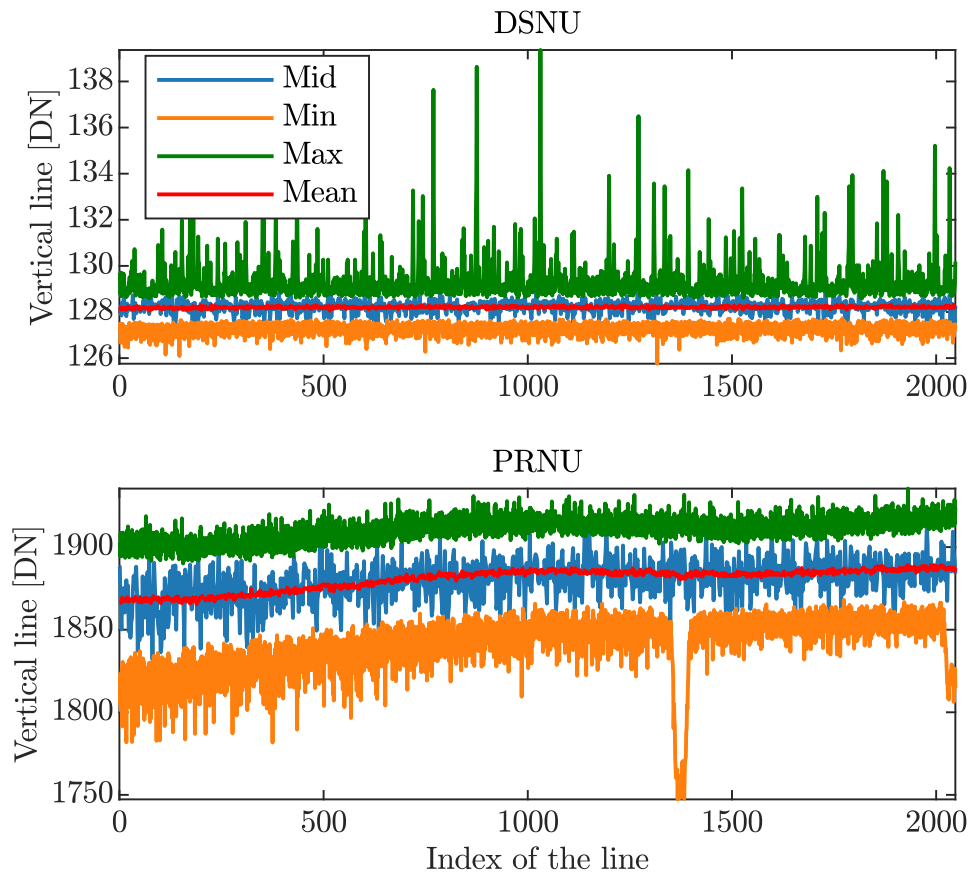
Accumulated Log Histogram PRNU



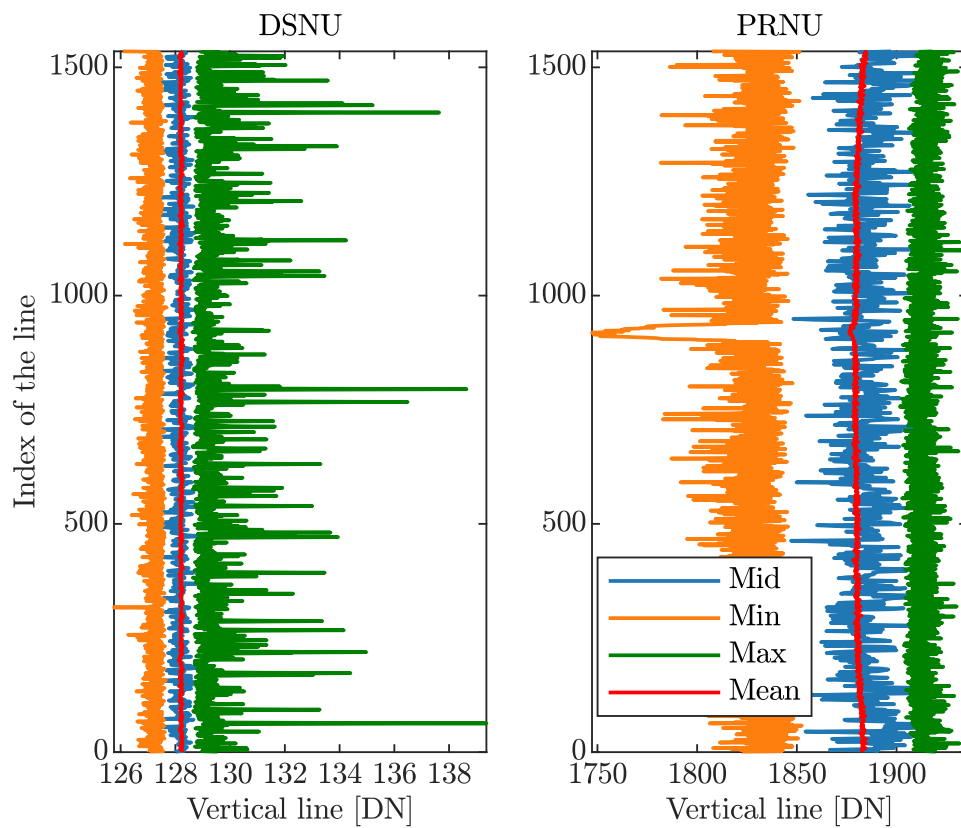
Accumulated Log Histogram DSNU



Horizontal Profile



Vertical Profile



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

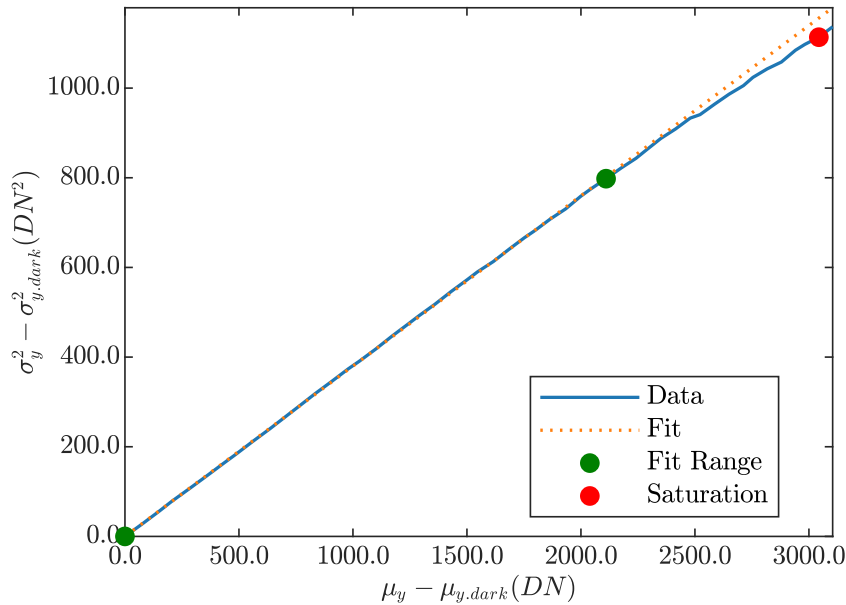
Camera setting

Gain	GainLevelx1
Black level	128

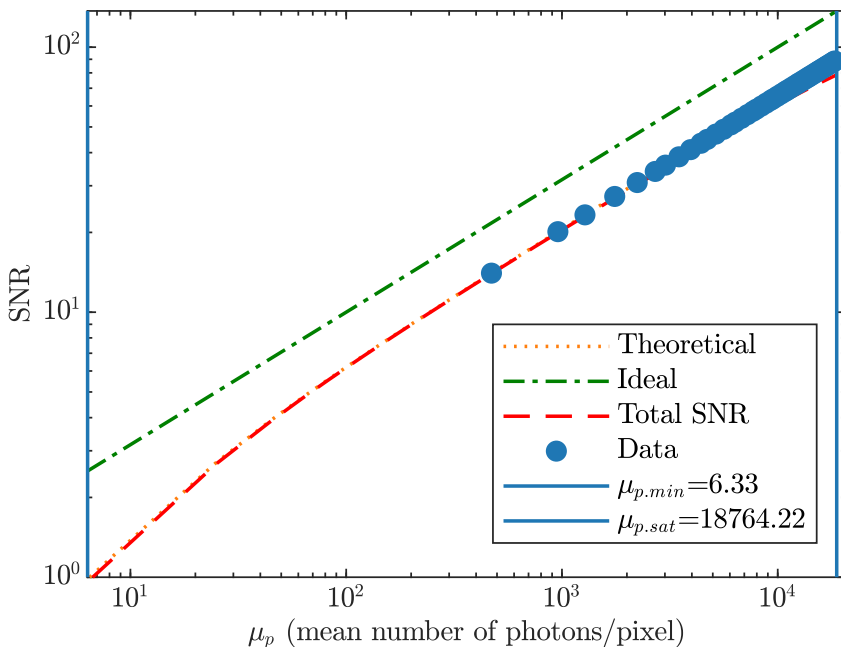
Operation point parameters

Environmental temperature	2.87
Camera body temperature	2.87
Sensor temperature	41.112
Processor temperature	38

Photon Transfer



Signal-to-Noise Ratio



Performance

Quantum efficiency

η	42.8343	%
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System gain

K	0.3799	DN/e ⁻
1/K	2.6322	e ⁻ /DN

Temporal dark noise

σ_d	2.0779	e ⁻
$\sigma_{y,dark}$	0.84054	DN

Signal-to-noise ratio

SNR _{max}	89.6522	
	39.0512	dB
	6.4863	bit
1/SNR _{max}	1.1154	%

Absolute sensitivity threshold

$\mu_{p,min}$	6.3326	p
$\mu_{p,min,area}$	0.53204	p/μm ²
$\mu_{e,min}$	2.7125	e ⁻
$\mu_{e,min,area}$	0.22789	e ⁻ /μm ²

Saturation capacity

$\mu_{p,sat}$	18764.2231	p
$\mu_{p,sat,area}$	1576.4943	p/μm ²
$\mu_{e,sat}$	8037.5202	e ⁻
$\mu_{e,sat,area}$	675.28	e ⁻ /μm ²

Dynamic range

DR	2963.1194	
	69.435	dB
	11.5329	bit

Spatial nonuniformities

DSNU ₁₂₈₈	0.61217	e ⁻
	0.23256	DN
PRNU ₁₂₈₈	0.60952	%

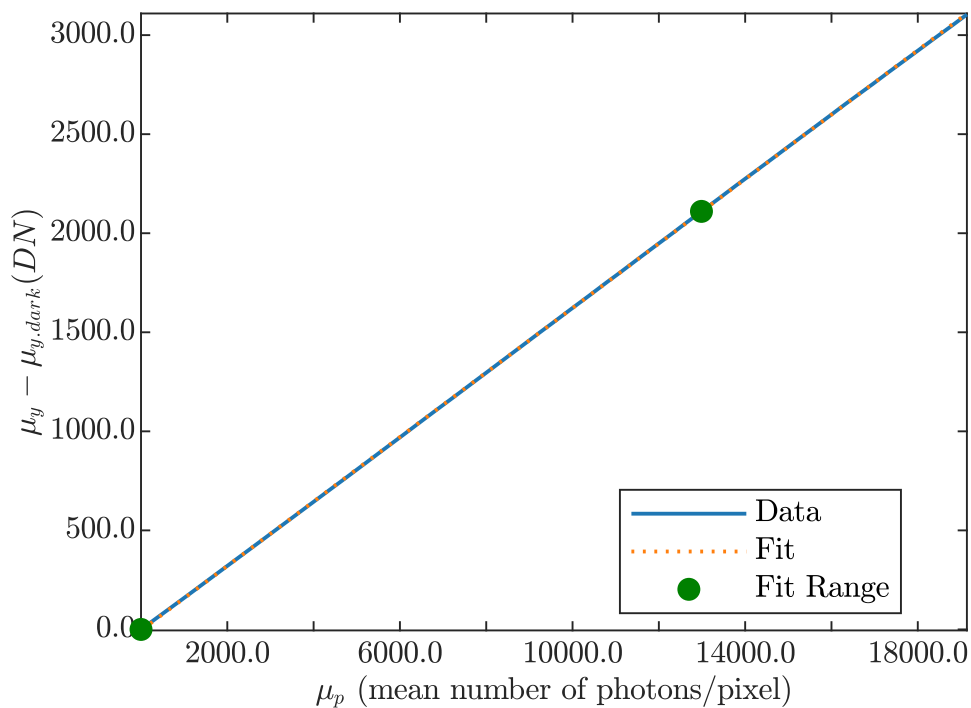
Linearity error

LE _{min}	-0.32046	%
LE _{max}	0.46719	%

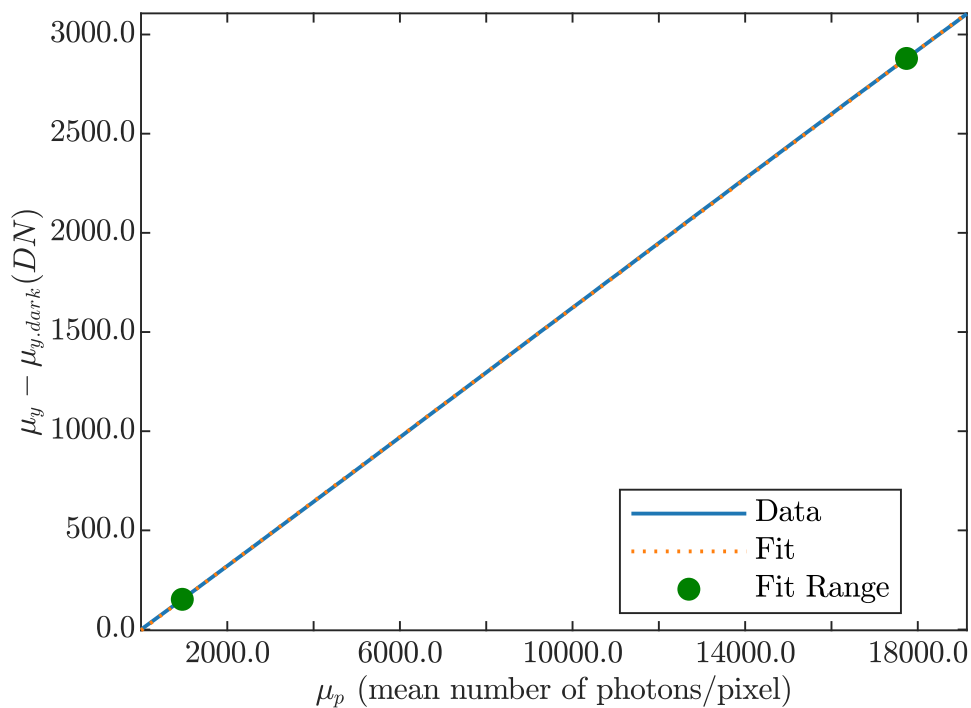
Dark current

$\mu_{l,mean}$	12.2311	e ⁻ /s
	4.6466	DN/s
$\mu_{l,var}$	0.64742	e ⁻ /s
	0.09344	DN/s

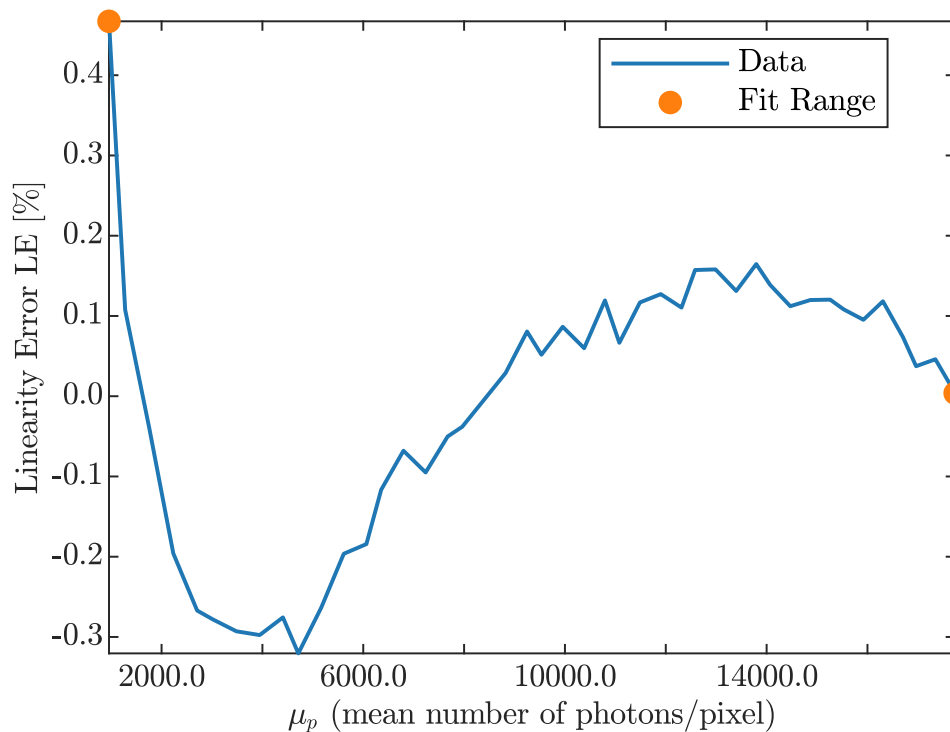
Sensitivity



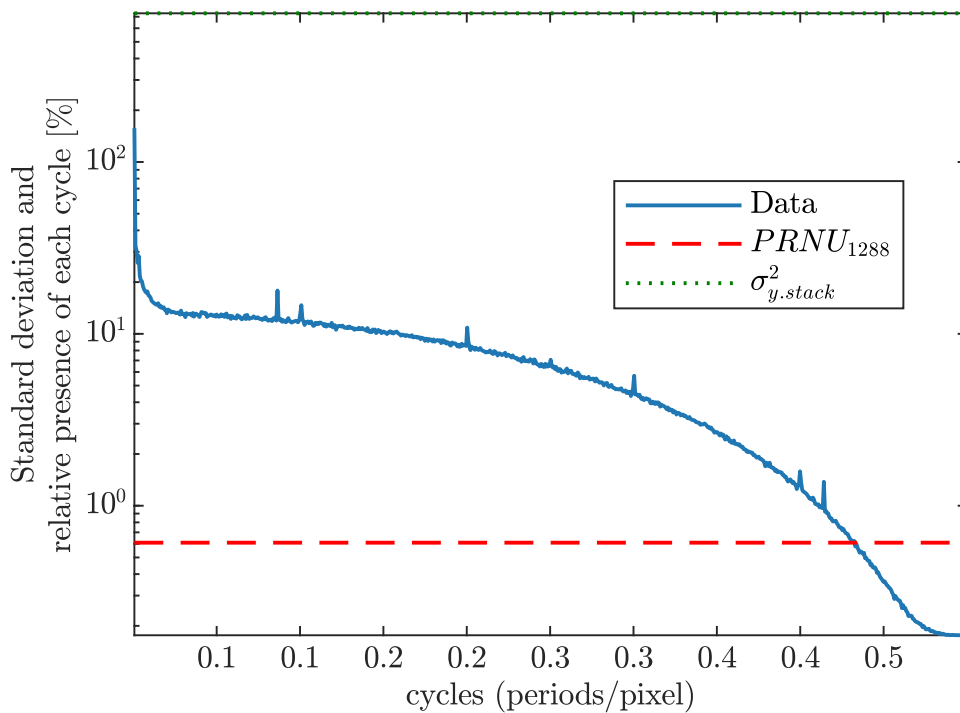
Linearity



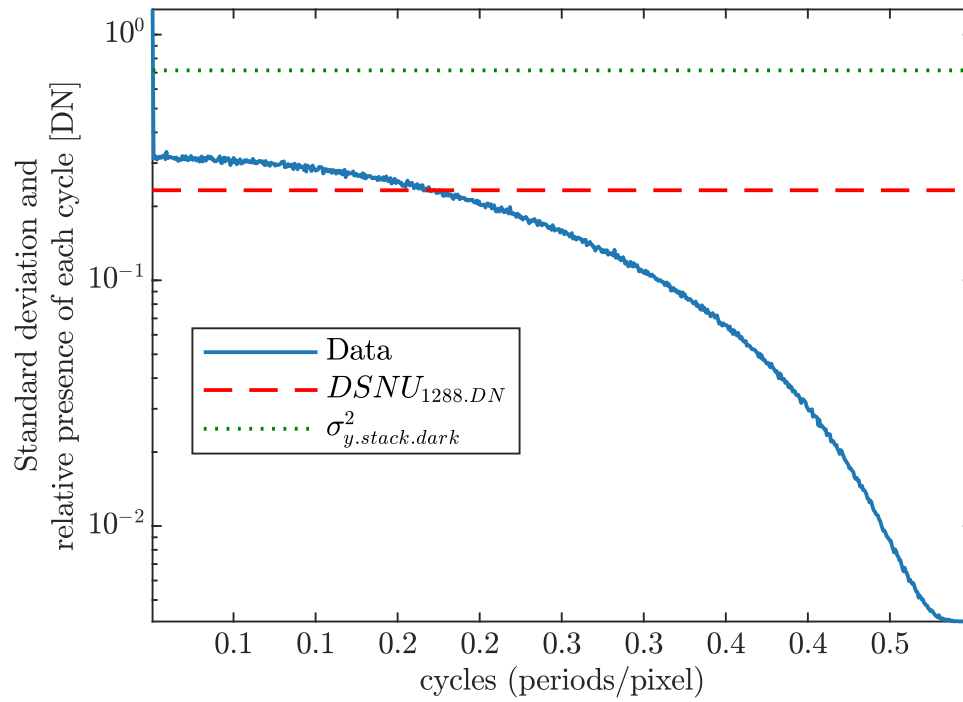
Deviation Linearity



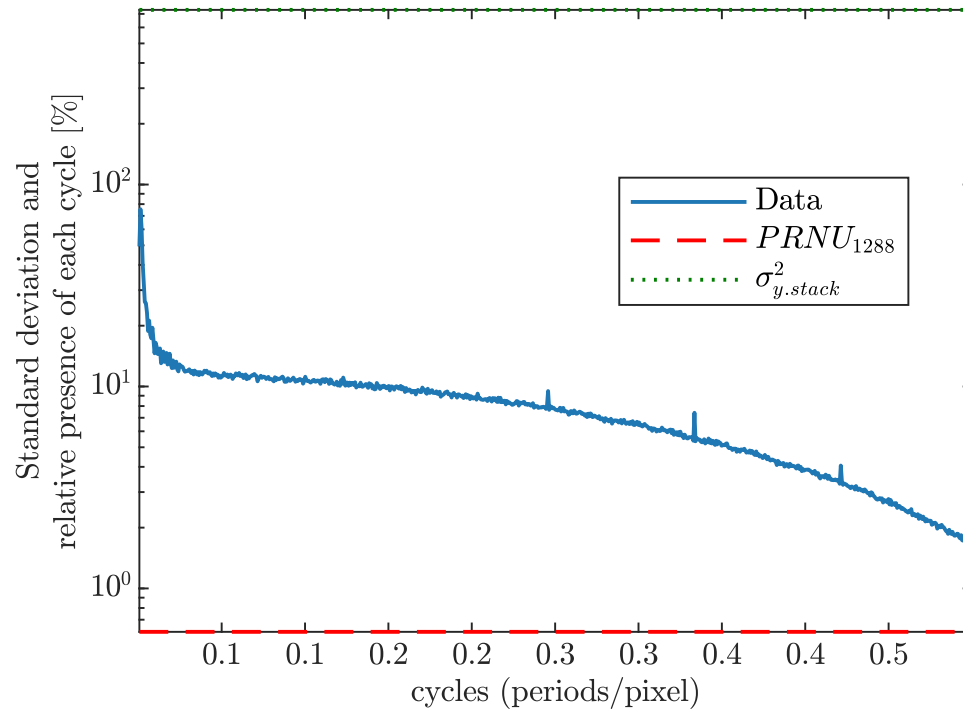
Horizontal Spectrogram PRNU



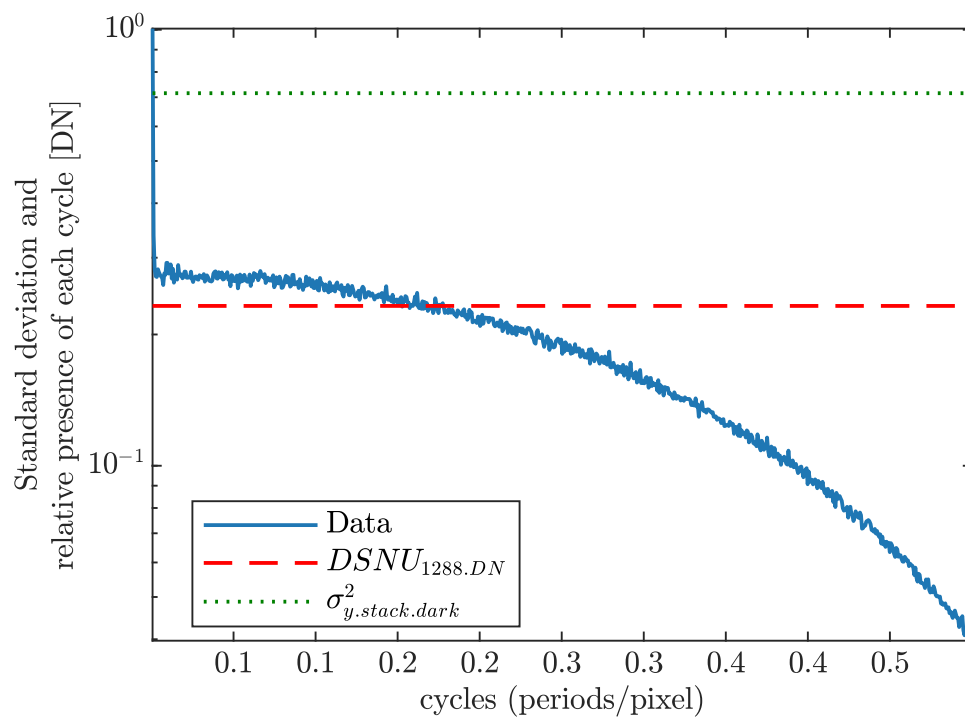
Horizontal Spectrogram DSNU



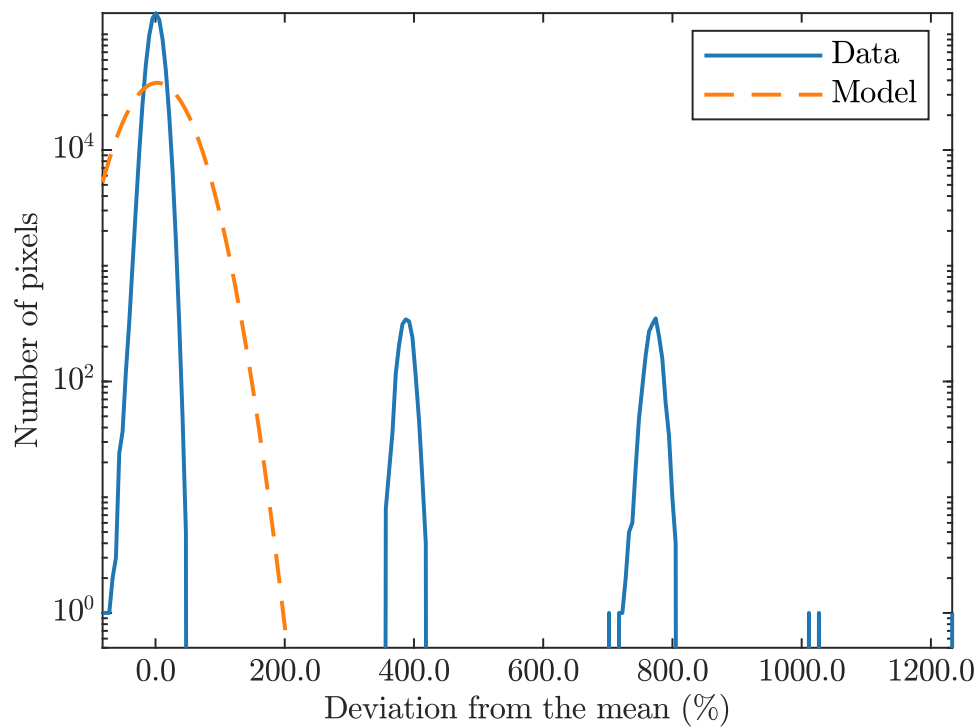
Vertical Spectrogram PRNU



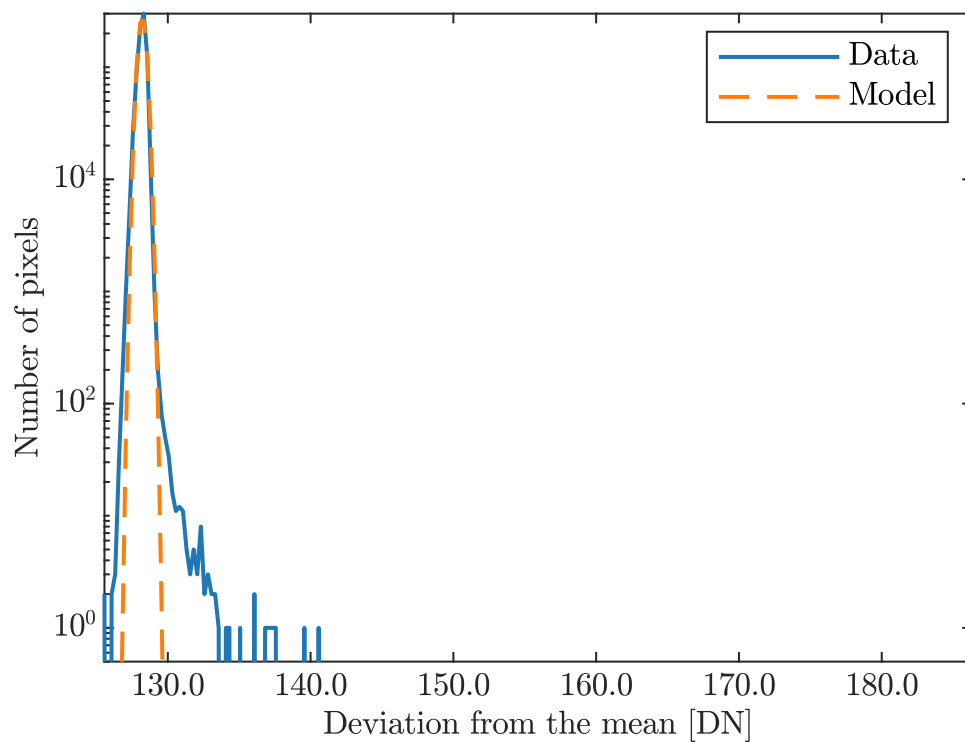
Vertical Spectrogram DSNU



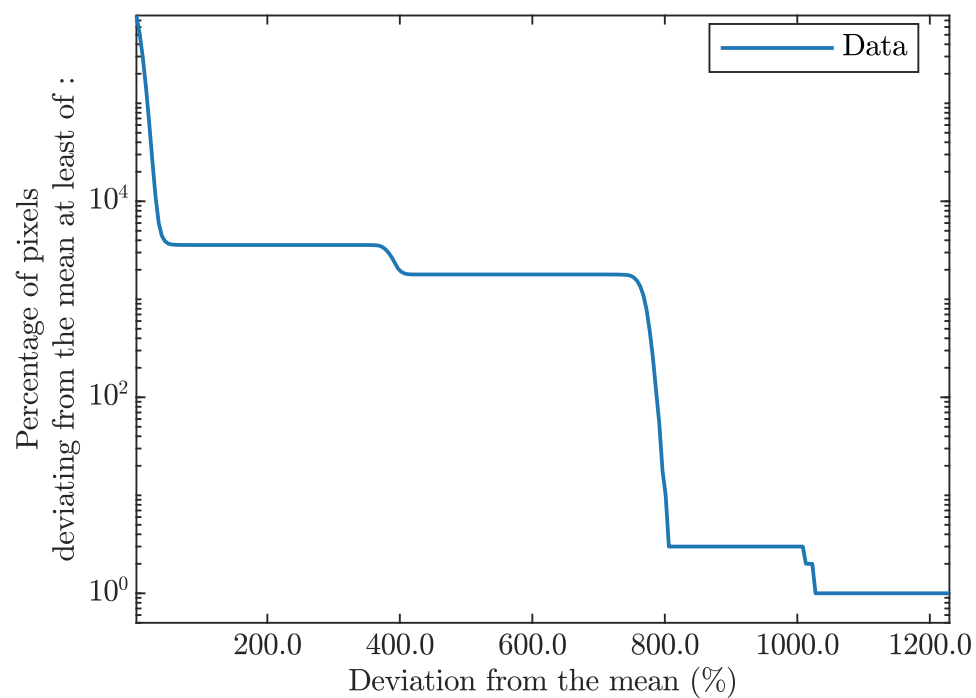
Logarithmic Histogram PRNU



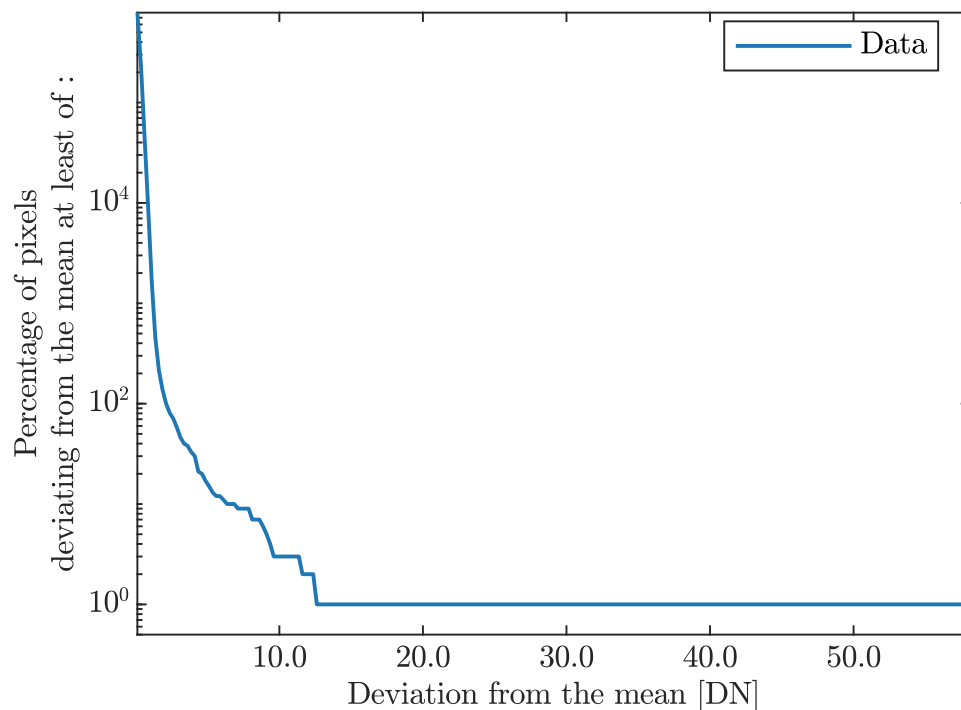
Logarithmic Histogram DSNU



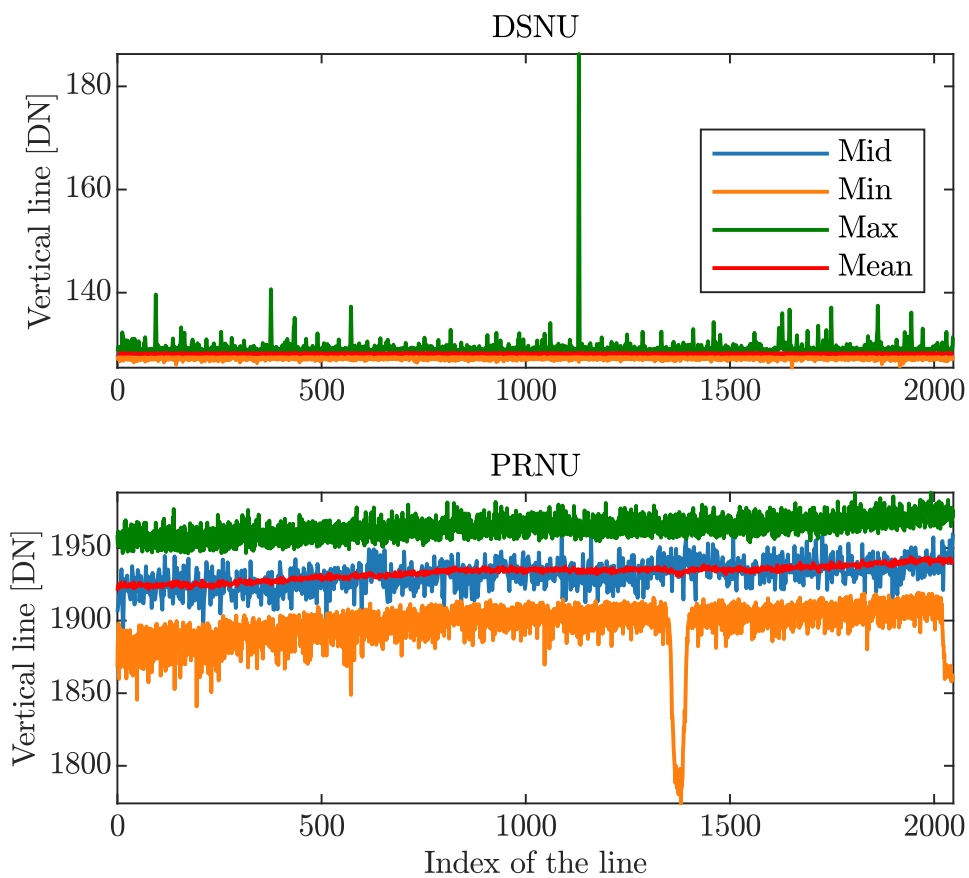
Accumulated Log Histogram PRNU



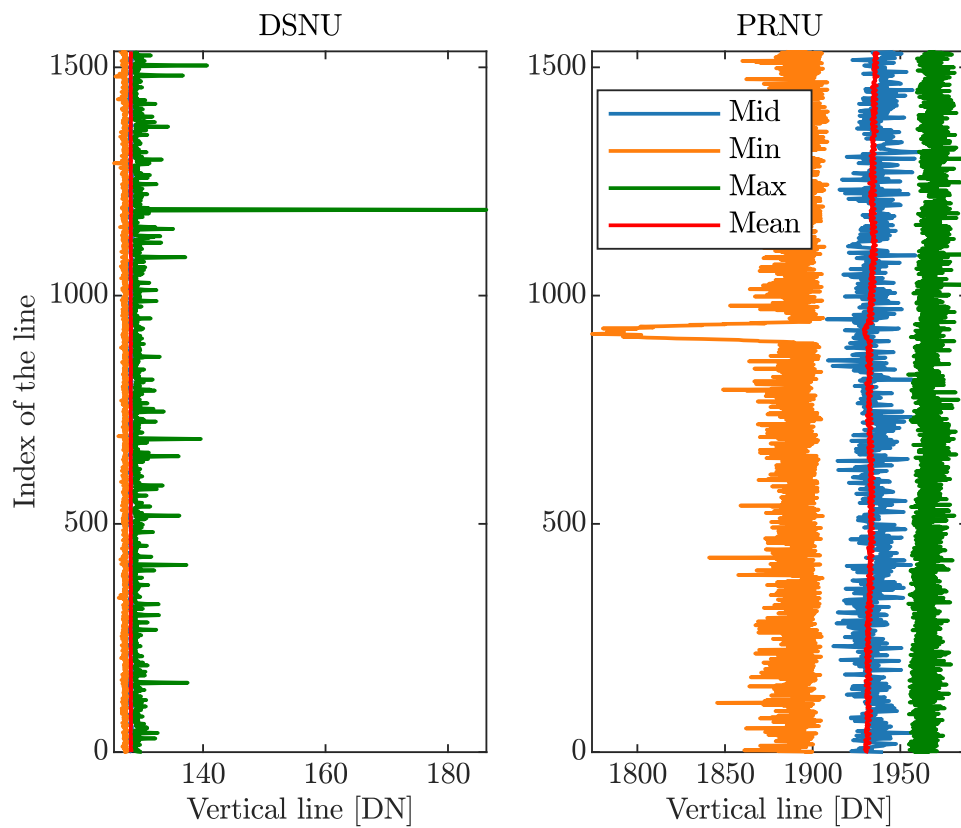
Accumulated Log Histogram DSNU



Horizontal Profile

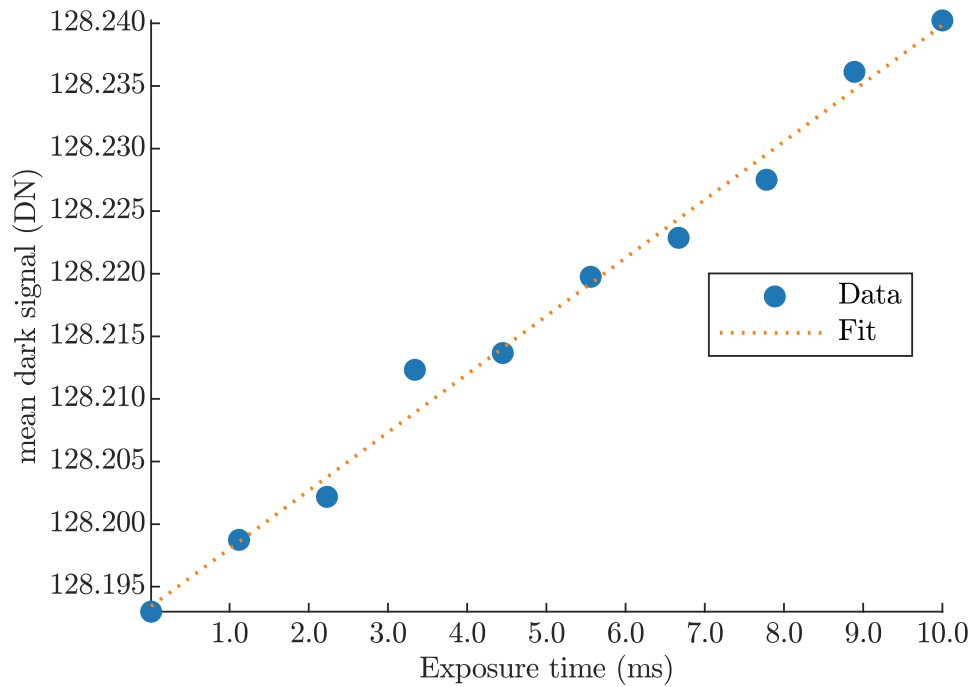


Vertical Profile

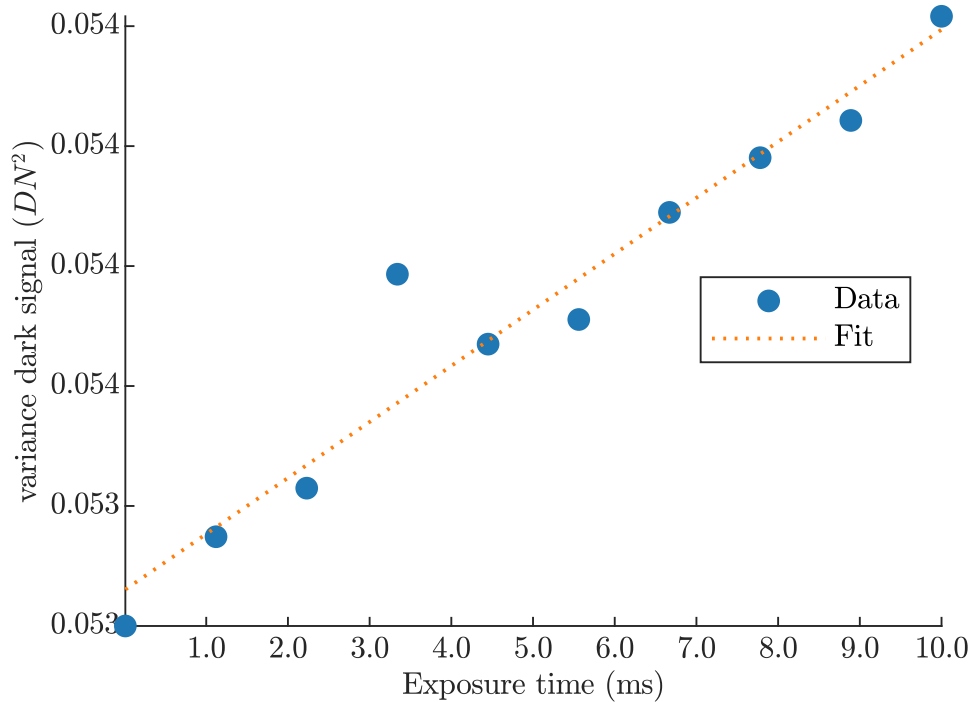


Dark Current

Dark Current from Mean



Dark Current from Variance



Acceptance Test Result (Not part of EMVA1288 standard)

Test Date

25-Nov-2020 14:13:07

Tester Name

Tester

Table 1: Acceptance test summary (Not part of EMVA1288 standard)

Test Number	Test Name	Test Status	Numeric Value	Margins	Failure Description
1	Dead Pixels	Pass	0	≤ 10	
2	Dead Clusters	Pass	0	≤ 1	
3	QE	Pass	55.7 47.9 42.8	$\geq 50 \geq 47 \geq 42$	
4	SNR	Pass	40.1 39.9 39.1	≥ 38	
5	DR	Pass	71.5 71.1 69.4	≥ 67	
6	Flash	Pass	-	-	
7	Uart	Pass	-	-	
8	SensorControl	Pass	-	-	
9	SensorLVDS	Pass	-	-	
10	Temperature	Pass	-	-	
11	Voltages	Pass	-	-	
12	MACOM	Pass	-	-	
13	GPIO	Pass	-	-	
14	DRAM	Pass	-	-	

Table 2: Dead pixels summary (Not part of EMVA1288 standard)

Number	Column	Row	Deviation from mean DSNU [DN]	Deviation from mean PRNU [%]
-	-	-	-	-

Summary Sheet for calibration of User Set Factory (Not part of EMVA1288 standard)

Camera setting

Gain	GainLevelx1
Black level	128
Frame rate	90 Hz
Exposure time	6000 μ s

Operation point parameters

Environmental temperature	2.93
Camera body temperature	2.93
Sensor temperature	40.808

Spectrum of Calibration light source

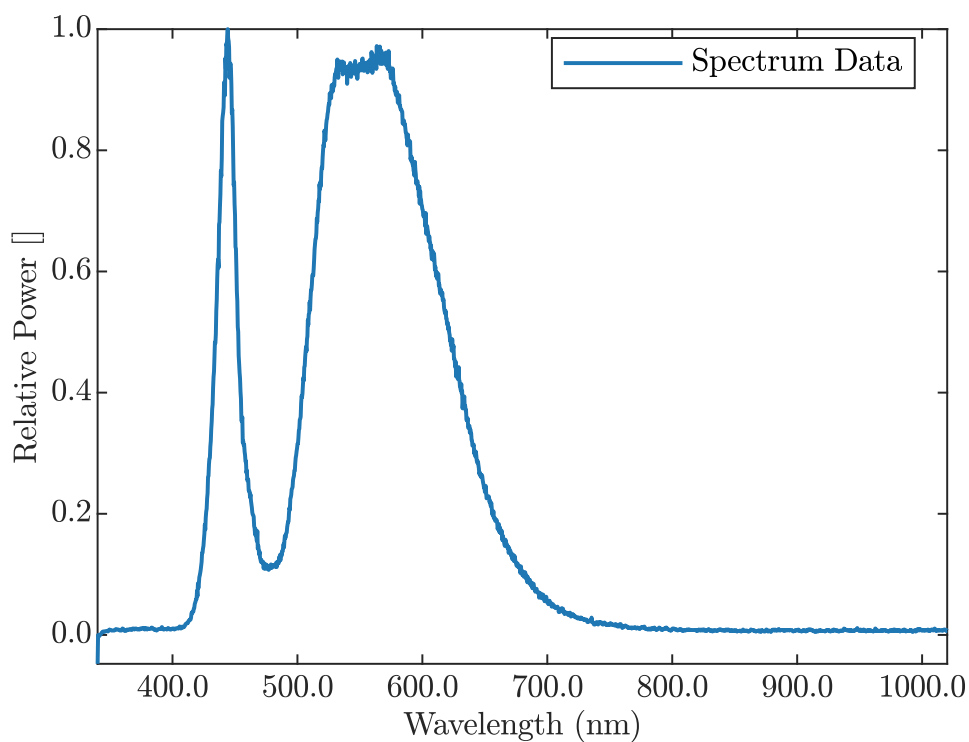


Table 3: Calibrated features summary

Number	Feature	Calibration Status
1	DSNU	Yes
2	PRNU	Yes
3	Bad Pixels	Yes
4	White Balance	Yes

Table 4: White Balance calibrated gains

Gain	Value
Red	1.4096
Green	1
Blue	1.5666

Dead Pixels

Table 5: Dead pixels summary

Number	Column	Row	Deviation from mean DSNU [DN]	Deviation from mean PRNU [%]
-	-	-	-	-

International Distributors



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