GROUP: NAME:

Detector Noise

1. Noise evaluation

Please provide a table with the different means and standard deviations including parameters for each image and each color, for blue, green and red. (4 dark noise, 2 nearly saturated).

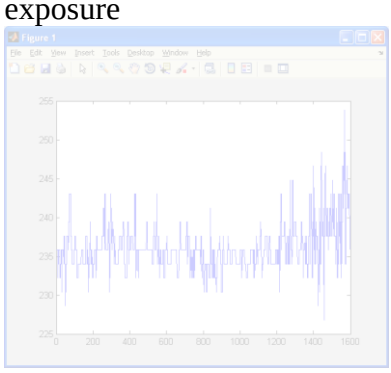
		RED		GREEN		BLUE	
		Mean	STD	Mean	STD	Mean	STD
Dark	Low Gain – Short exposure						
	High Gain – Short exposure						
	Low Gain – Long exposure						
	High Gain – Long exposure						
Bright	Low Gain – adjusted exposure						
	High Gain – adjusted exposure						

Give example line plots with a width of one line taken in the middle of the image for the measurement. (select one channel – red, green or blue, **six plots** (4 dark noise, 2 nearly saturated, select one channel – red, green or blue).

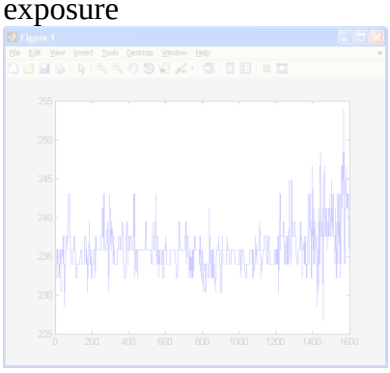
Specify the channel color you have selected : ….

Dark noise plots

Picture 1 - Low Gain – Short exposure

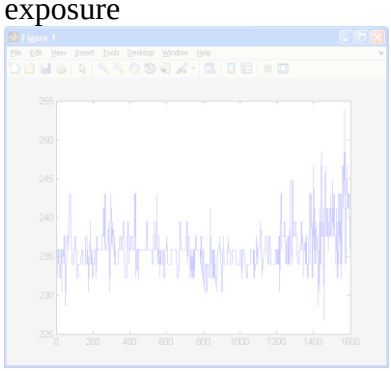


Picture 2 - High Gain – Short exposure

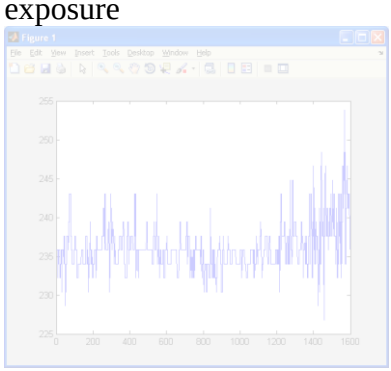


GROUP: NAME:

Picture 3 - Low Gain – Long exposure

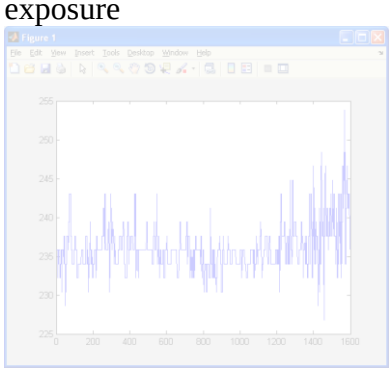


Picture 4 - High Gain – Long exposure

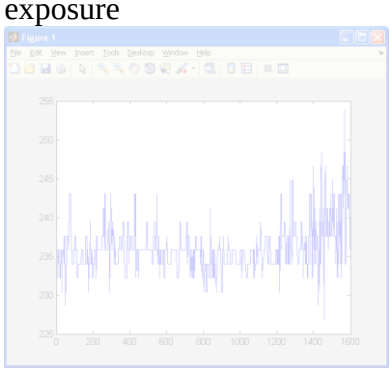


Bright images

Picture 1 - Low Gain – adjusted exposure



Picture 1 - High Gain – adjusted exposure



Comments:

GROUP: NAME:

2. Noise reduction by averaging (45 min)

Show one set of example images like in Figure 14 for the high gain! (one channel – red, **four plots**). Make a table with the values for single line for low and high gain.

Picture 1 – Step image

Picture 2 – Line plot

Picture 3 – cropped line plot low signal

Picture 5 – cropped line high signal

Find out how many lines (N = ?) from the high gain image have to be averaged to compensate the noise added by the gain!

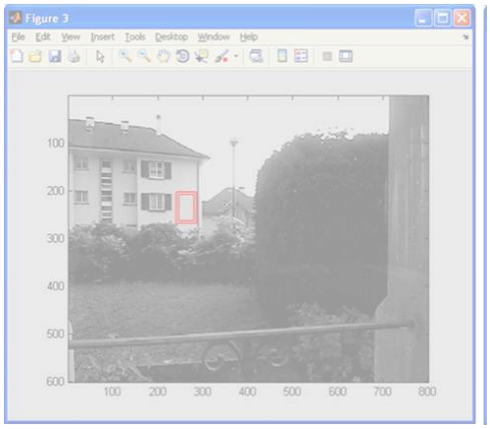
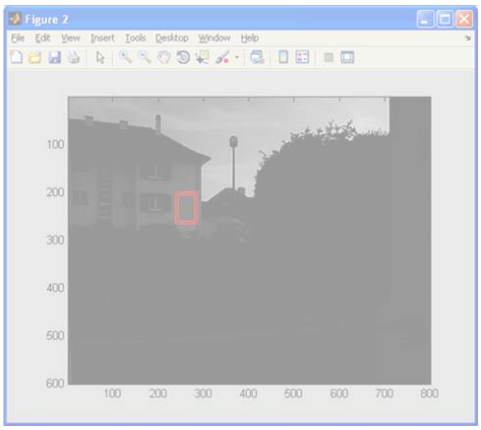
	Low gain N=1	High gain N=1	High Gain N = ???
MEAN_red_left			
STD_red_left			
MEAN_red_right			
STD_red_right			

GROUP: NAME:

Comments:

3. High dynamic range imaging (45 min)

Show the images with the ROI (**two plots**).

Picture 1 – High Gain exposure setting	Picture 2 – Low Gain exposure setting
	

Indicate the **measurement zone** in the images!! Find the values as below

Image **high gain**: **MEAN_ROI =**

STD_ROI =

Image **low gain**: **MEAN_ROI =**

STD_ROI =

Evaluate the dynamic range increase obtained by the changing of the gain from low to high and **c**alculate the dynamic range factor G with its error! (use the standard deviations as errors for the input values)

The dynamic range factor G is

$$G_0 = \frac{Mean\ signal\ value\ for\ high\ gain}{Mean\ signal\ value\ for\ low\ gain} = \frac{MEAN\_ROI_{high\ gain}}{MEAN\_ROI_{low\ gain}} = \ldots\ldots\ldots$$

GROUP: NAME:

Error calculation

$$\frac{\Delta G}{G_0} = \sqrt{\left|\frac{\left(STD_{ROI\,high\ gain}\right)}{MEAN_{ROI\,high\ gain}}\right|^2 + \left|\frac{\left(STD_{ROI\,low\ gain}\right)}{MEAN_{ROI\,low\ gain}}\right|^2} = \ldots\ldots\ldots\ldots + \ldots\ldots\ldots\ldots =$$

Give the final result

$$\boldsymbol{G = G_0 \pm \Delta G =} \ \ldots\ldots\ldots\ldots \quad \pm \ \ldots\ldots$$

Show an example of high dynamic range imaging and provide the **three images** as shown in the example. Indicate in the image in which area one can gather supplementary information.

Picture 1 - bright	Picture 2 - dark	Picture 3 – HDR combined

Describe below what are your observations.

Comments:

GROUP: NAME:

4. Web example for HDR

Find a HDR example image on the web and cite correctly!

Picture 1 – example image

https://www.fotor.com/features/hdr.html, downloaded 20.2.2019

What is your opinion about such images?

Comments:

GROUP: NAME:

(Optional) Personal feedback:

Was the amount of work adequate?

What is difficult to understand?

What did you like about it?

How can we do better?