E-ELT PROGRAMME
OPTIMOS-DIORAMAS Study

Instrument configurations, conventions and coordinate references for DIORAMAS

E.TRE.DIO.509.1061

February 17, 2010

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Change record

Issue	Date	Section / Paragraph affected	Reason / Initiation Documents / Remarks
1	2/17/10	All	
1	2/18/2010	Filter	Updated blue cut in visible

1 Scope

This document presents the observing configurations for DIORAMAS. There are two main configurations: imaging and multi-object spectroscopy (MOS) in the visible and the near-infrared (NIR).

Section 2 introduces to the DIORAMAS optical layout. The conventions and coordinate system are described in Section 3. Section 4 lists the filters and gratings for the observations in the visible, while Section 5 does it for the NIR. The various options for visible/NIR cross-configurations are described in Section 6. The possible configurations for the masks are given in Section 7.

2 Optical layout configuration

The DIORAMAS optical layout is presented in the figure below.

This is a *vertical configuration*. Looking from the spectrograph side in the negative Z direction, the two right quadrants are for the VIS channels: blue then green with increasing Y. The two left quadrants are for the NIR channels (yellow then red with increasing Y).

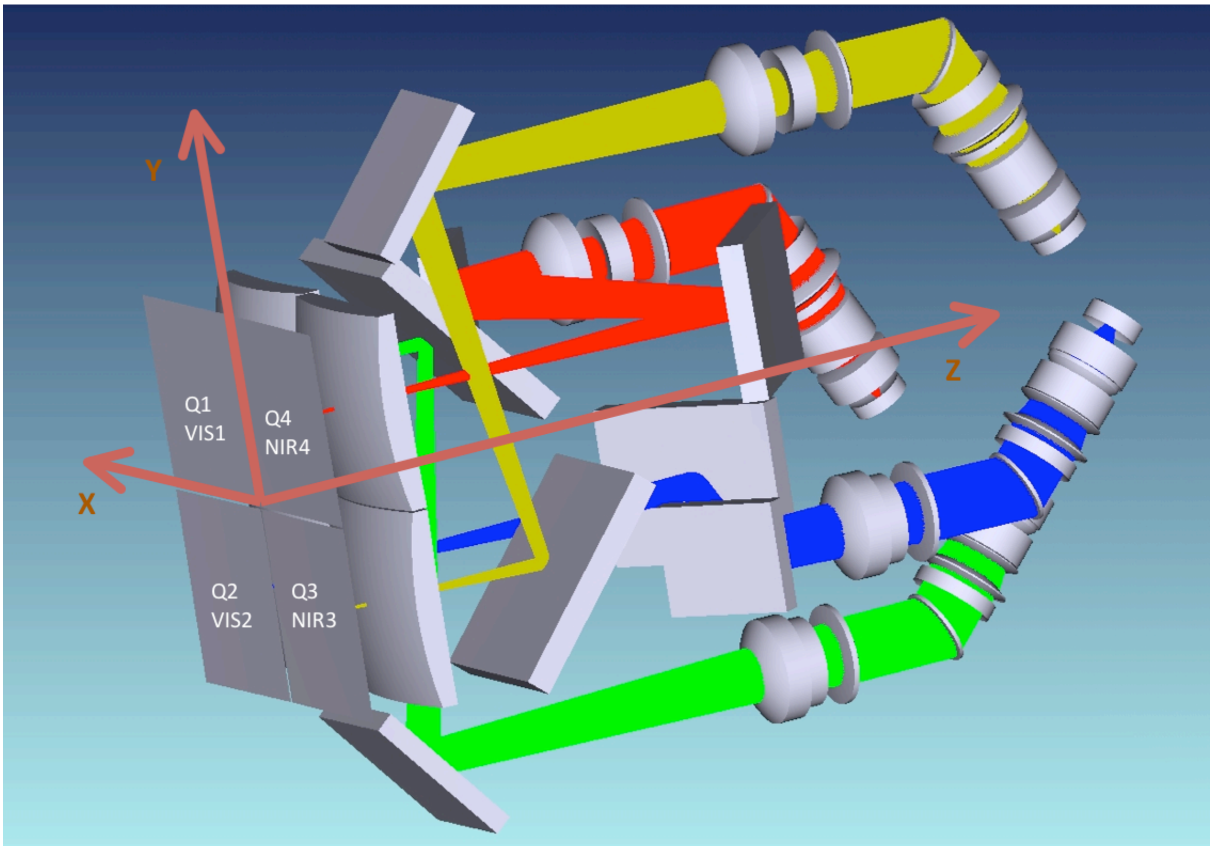

Figure 1: Optical layout for DIORAMAS. Looking from the spectrograph side in the negative Z direction, the two right quadrants are for the VIS channels: blue then green with increasing Y. The two left quadrants are for the NIR channels (yellow then red with increasing Y).

3 Conventions, references and names

3.1 Field of view and detectors

The FOV per quadrant is 3.32 x 3.32 arcmin² . There is a gap of 0.069 arcmin on each quadrant for the mask cross.

Total FOV: (3.32 + 0.069) x (3.32 + 0.069) arcmin² = 6.78 arcmin².
On the detector: 4096 pixels for the imaging field corresponding to 61.44 mm. For the dispersion direction : 3 x 4096 + 2 gaps of 6 mm between the chip, hence196.32 mm, équivalent to 13088 pixels.

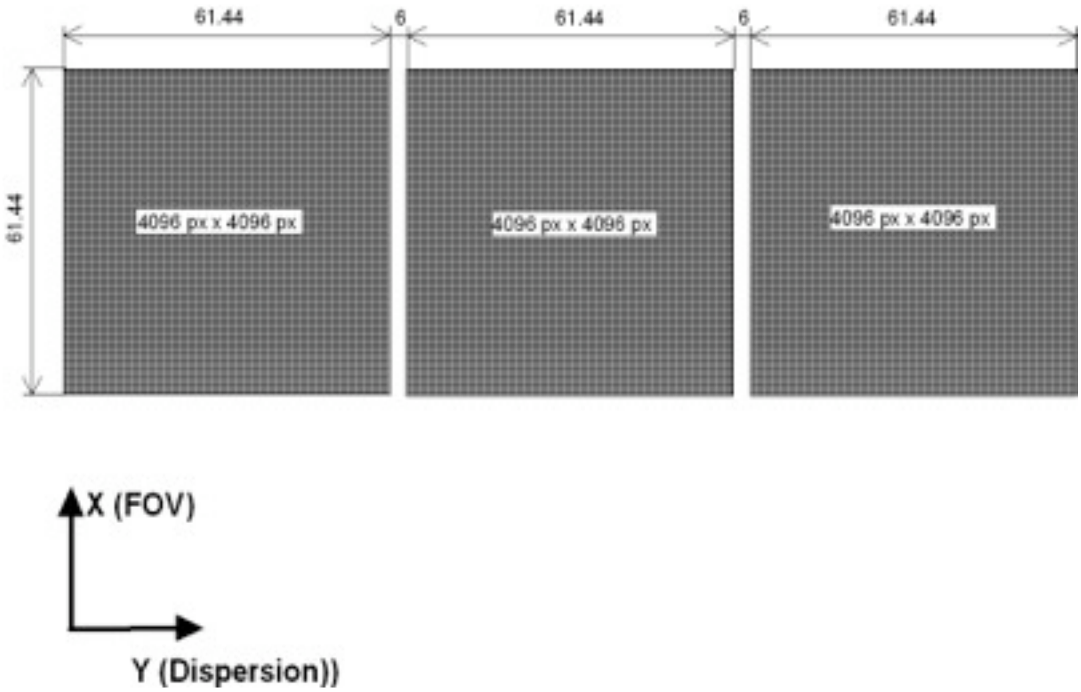

Figure 2: Schematic of the detector focal plane array (see text above)

3.2 XY axes on the detectors

The detectors are arranged so that the longest dimension (12 K)of the combined array is along the dispersion direction (Y), and the shortest (4K) along the spatial direction (X). This is shown in the figure below.

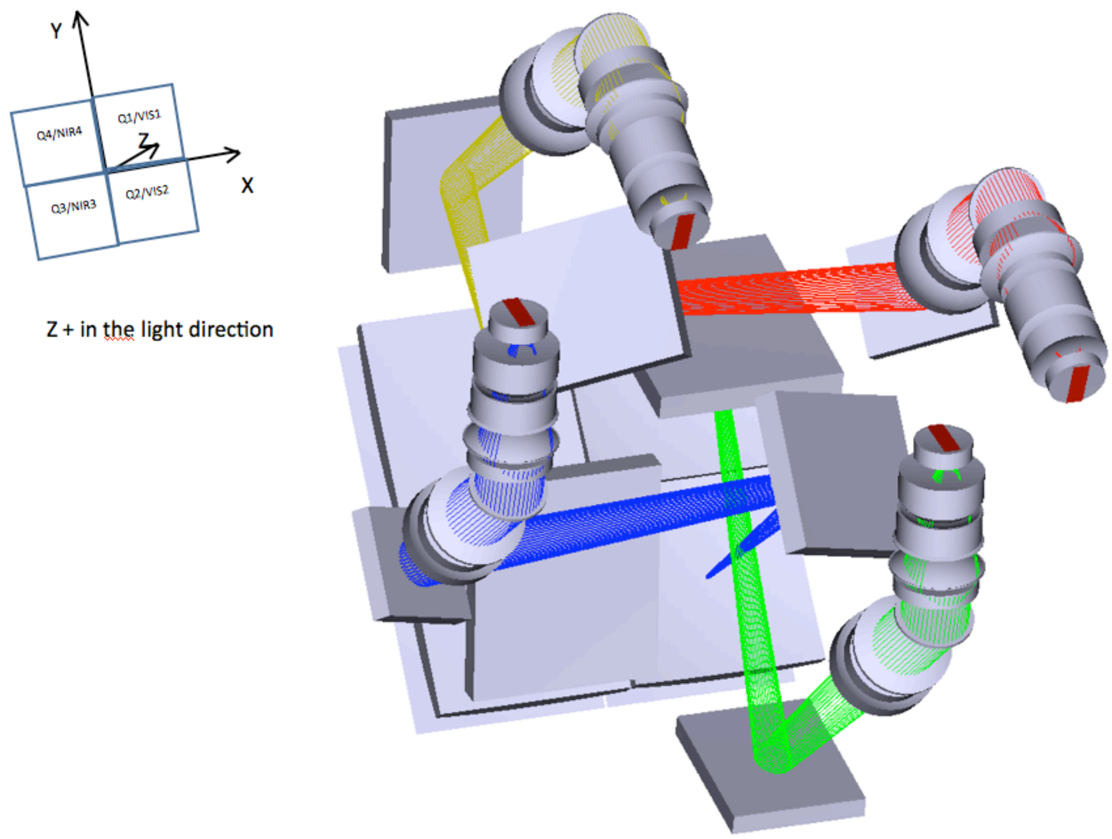

Figure 3: Sketch illustrating the orientation of the X- and Y-axis on the arrays of detectors.

3.3 XY axes on the masks

The axes of the mask will be termed X and Y where Y is the axis parallel to the dispersion direction. The Z axis is towards the spectrograph.

3.4 Slit sizes: length and width

The size of the slit width will have a typical size of 1.8 mm (along the Y axis on the mask) with a typical length of 18 mm (along the X axis).

3.5 Name convention for reservoirs and masks

The sketch below summarizes the configuration and the possible names to reference the channels during the instrument design and development. **Here, this assumes a view of the backbone cross mask from the spectrograph side (towards negative Z).**

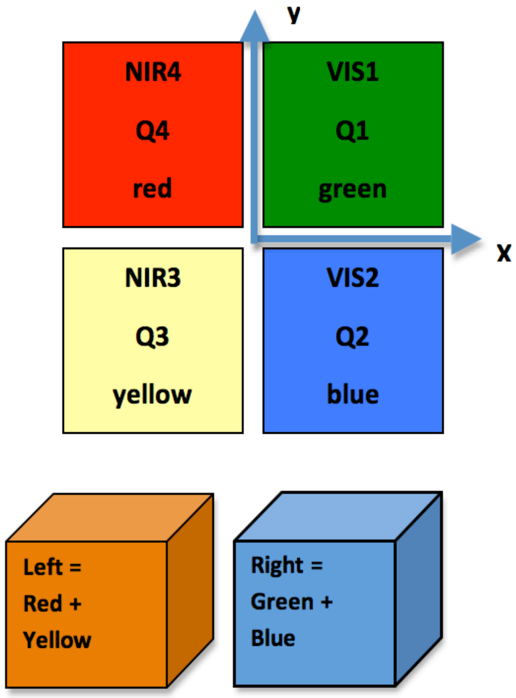

Figure 4: Layout of the mask and reservoirs seen from the spectrograph side.

3.6 Mask exchange robot axes

We refer to Y as the vertical direction of the main mask exchange robotic arms. So the backbone cross mask will be in the XY plane.
We currently refer to Z as the depth axes (masks in the reservoirs will be stacked in Z)

3.7 Mask reservoirs and Reservoir Sets

We propose to use letters (A B etc.) to distinguish the different couples of reservoirs (e.g. "at one time A is used at the instrument while B is at the laser machine or vice-versa"

We propose to call the two reservoirs in a set as e.g. L and R (left and right). We might use F and B (for front and back) if one refers to the order they are attached on the rail entering the instrument enclosure.
Currently we have L = Q3+Q4   R = Q1+Q2

3.8 Filter/Grating Exchange Configuration

Each Filter/Grating Exchange robot will have access to two channels on each side of the instrument. Each robot will change one VIS channel and one NIR channel. The 4 cabinets for each robot will include filters and gratings for both the VIS and the NIR.

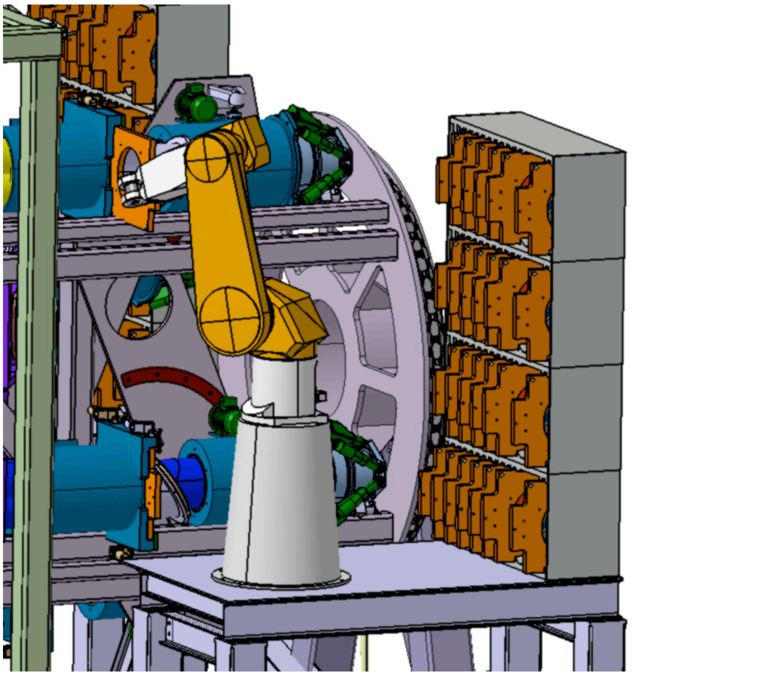

Figure 5: Filter/Grating and Exchange System concept

4 Visible channel

The list of filter and gratings is provided below for the visible channels:

Config ID	Filter/Dispersive Element	Spectral resolution	Grating type	Grating angle (°)	Camera angle (°)	Spectra length in pixel	Camera Position
V1	Filter U				-		Straight-through
V2	Filter G				-		Straight-through
V3	Filter R				-		Straight-through
V4	Filter I				-		Straight-through
V5	LR grating [0.38 µm *(0.37 TBC)*, 0.76 µm] + Blocking filter	300	CTG	0	6.96	2036	Rotated LRB
V6	LR grating [0.6 µm, 1.00 µm] + Blocking filter	423	CTG(1)	0	9.75	2148	Rotated LRR
V7	MRB grating [0.38 µm *(0.37 TBC)*, 0.76 µm] + blocking	1040	CTG(1)	0	22.88	7126	Rotated MRB
V8	MRR grating [0.5 µm, 1.0 µm] + blocking	1040	CTG(1)	0	22.86	7117	Rotated MRR
V9	HR grating [0.38 µm *(0.37 TBC)*, 0.55 µm] + blocking	2370	FSE(2)	25.65	51.30	8960	Rotated HR

V10	Filter G + Na rejection filter				-		Straight-through
V11	Clear + pupil mask				-		Straight-through

(1) CTG: Classical Transmission Grating

(2) FSE: Fused Silica Etched grating (Horiba-JY)

5 NIR channel

The list of filter and gratings is provided below for the near-infrared channels:

Config ID	Filter/Dispersive Element	Spectral resolution	Grating type	Grating angle (°)	Camera angle (°)	Spectra length in pixel	Camera Position
N1	Filter Z				-		Straight-through
N2	Filter Y				-		Straight-through
N3	Filter J				-		Straight-through
N4	Filter H'				-		Straight-through
N5	Narrow band filter 1				-		Straight-through
N6	Narrow band filter 2				-		Straight-through
N7	LR grating [0.6 µm, 1.00 µm] + Blocking filter	423	CTG)	0	9.75	2148	Rotated LRB
N8	LR grating [0.86 µm, 1.40 µm] + blocking	423	CTG	0	9.76	2056	Rotated LRR
N9	MR grating [0.86 µm, 1.40 µm] + blocking	825	CTG	0	18.45	3996	Rotated MR
N10	HRB grating [0.86 µm, 1.10 µm] + blocking	3010	FSE	31.39	62.78	7579	Rotated HRB
N11	HRR FSE grating [1.10 µm, 1.40 µm] + blocking	3010	FSE	31.39	62.78	7422	Rotated HRR
N12	Clear + pupil mask				-		Straight-through

6 Imaging / MOS observing configurations

There are 5 Visible camera positions constrained by the optimized angle of the light path for either imaging or spectroscopy (straight through, LR, MRB, MRR, HR). The same applies to the NIR camera positions (straight through, LRB, LRR, MR, HRB, HRR).

Cross-observing modes (imaging in VIS in parallel to MOS, and vice-versa) in the NIR is not permitted. Assuming all gratings for Vis and NIR are working at different angle, there will be 21 different possible observing configurations, as described below:

	NIR IMAGING	NIR LRB MOS	NIR LRR MOS	NIR MR MOS	NIR HRB MOS	NIR HRR MOS
VIS IMAGING		Filter = dark?		Filter = dark?	Filter = dark?	Filter = dark?
VIS LR MOS						
VIS MRB MOS						
VIS MRR MOS						
VIS HR MOS						

7 Mask configurations

The table below gives the possible configurations for the masks for the observing configurations described above.

	NIR IMAGING	NIR LR MOS	NIR MR MOS	NIR HR MOS
VIS IMAGING	None	DARK MASK	DARK MASK	DARK MASK
VIS LR MOS	? DARK MASK?			
VIS MR MOS	? DARK MASK?			
VIS HR MOS	? DARK MASK?			