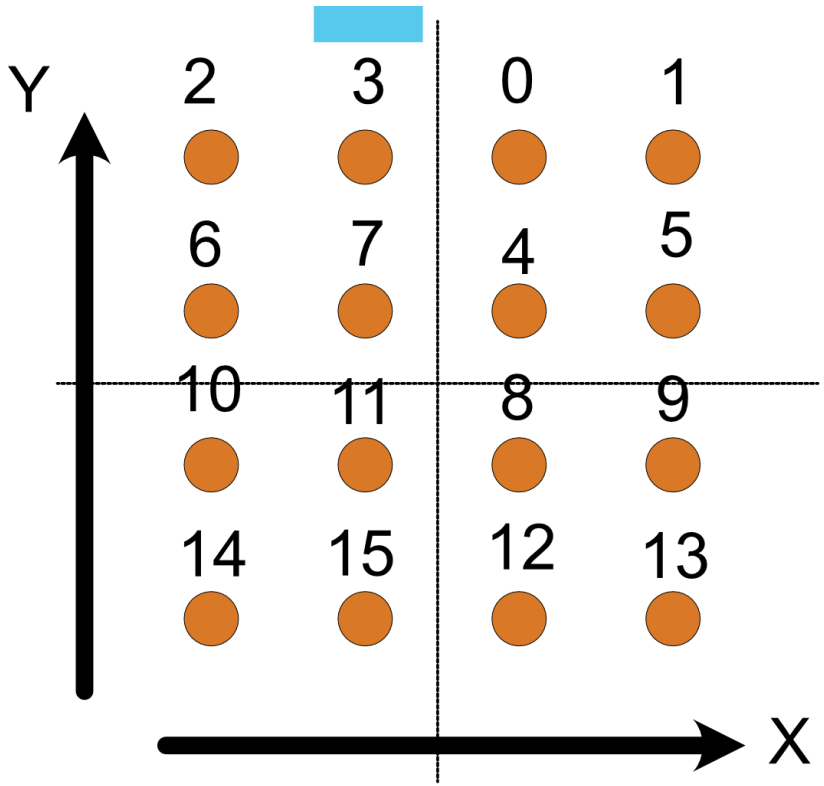
Uniformities

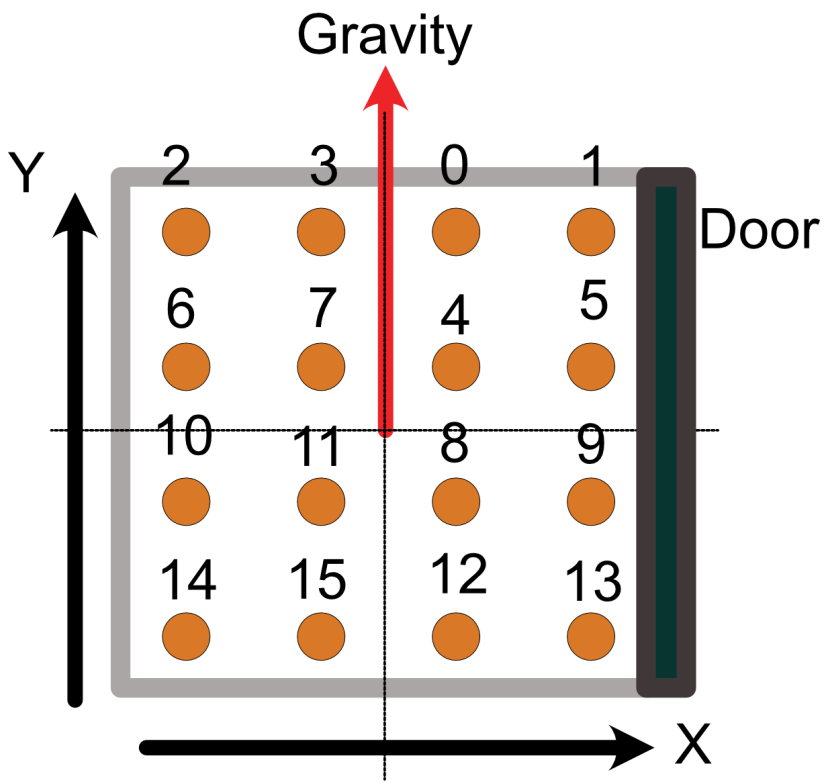
18/10/24

Reminder: Conventions



- X-Y convention derived from the drift chambers
- Propagated to the Xm-Ym variables
- Blue square is the drift chamber blind zone

Reminder: Conventions

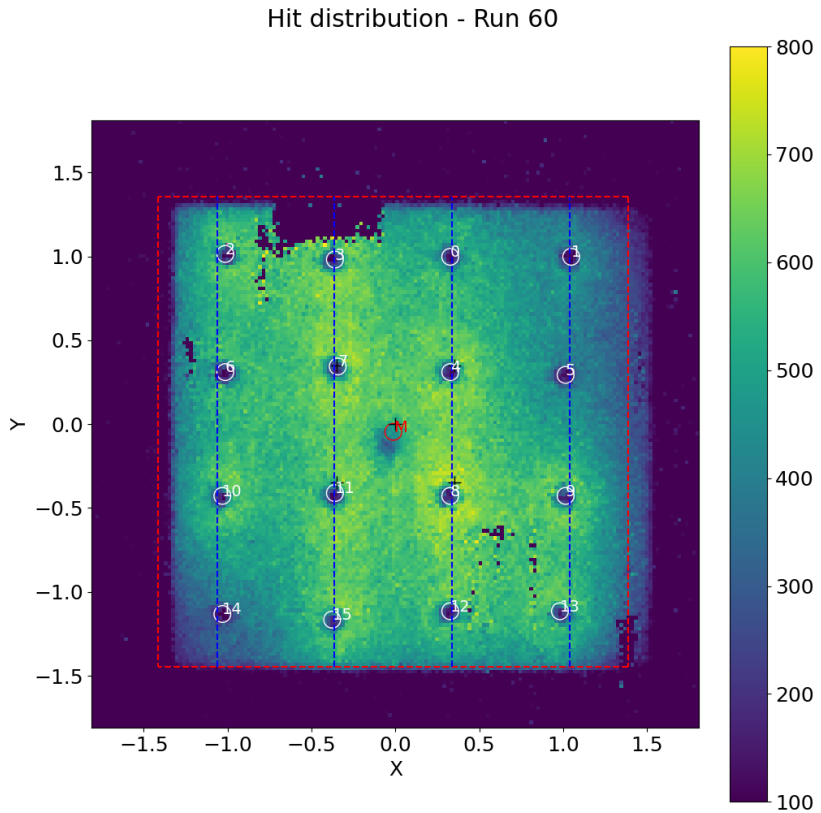


- X-Y convention derived from the drift chambers
- Gravity and GRAiNITA door (for inserting the grains) added

Looking at GRAiNITA

- Increase the field of view
- Compute the centre M as the middle of the 4 center fibres
- Add boundaries at ± 1.4 cm

Detector boundaries are not where they are expected.



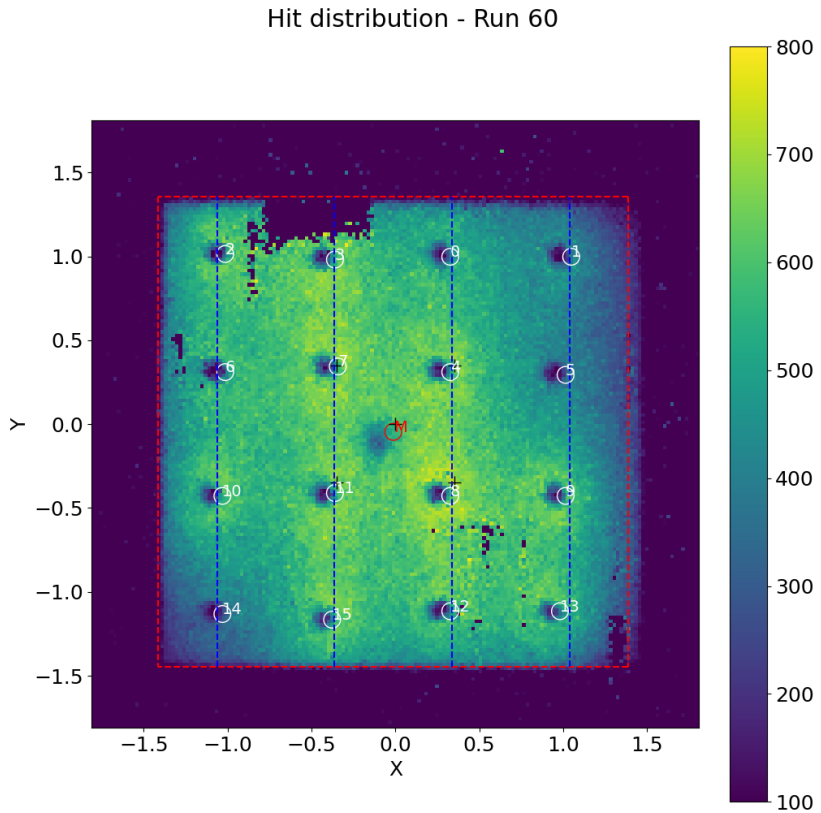
Troll 1 - Muons

Looking at GRAiNITA

Centering (by eye):

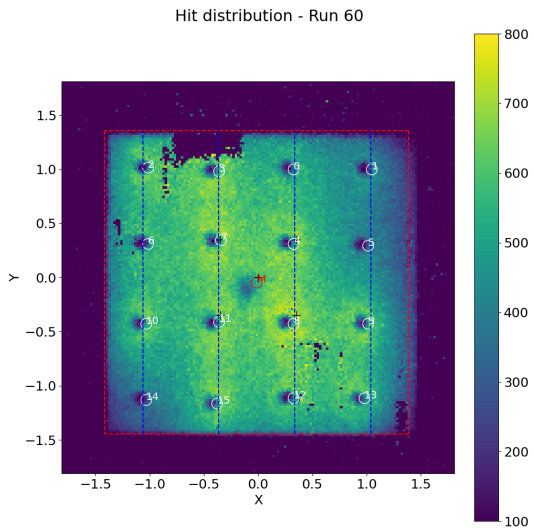
- -600 μm in X
- +150 μm in Y
- Still a bit more on the right (door ?)
- Fibres shifted to the left (door pushing ?)

Seems to have a door effect (break on through to the other side).

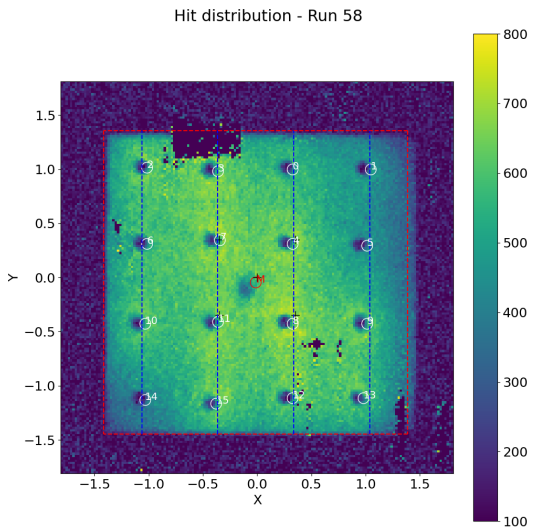


Troll 1 - Muons

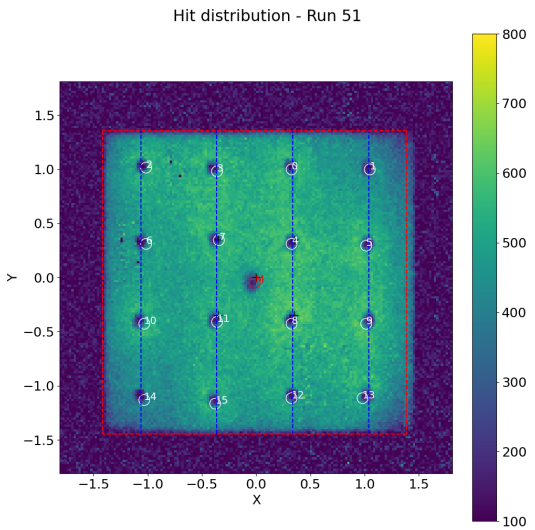
Looking at GRAiNITA



Troll 1 - HL - Muons



Troll 1 - HL - Pions

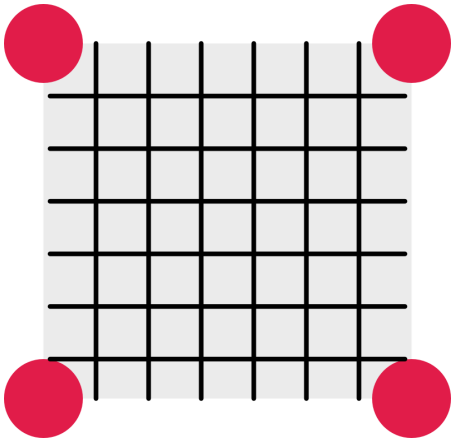


Troll 1 - Water - Pions

- No differences between the Pions and Muons run with heavy water
- It seems that the fibres moved during the cleaning-refilling of the grain procedure.
- The 4Sq are distorted by the fibre positions

III. Uniformity map

Geometry



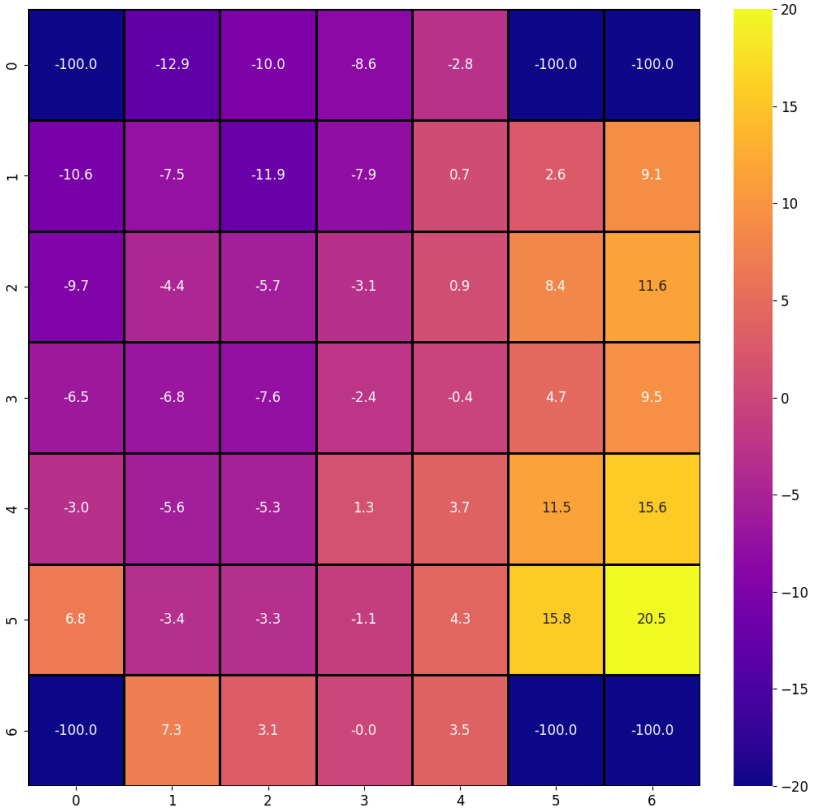
4Sq definition

4Sq 0	4Sq 1	4Sq 2
4Sq 3	4Sq 4	4Sq 5
4Sq 6	4Sq 7	4Sq 8

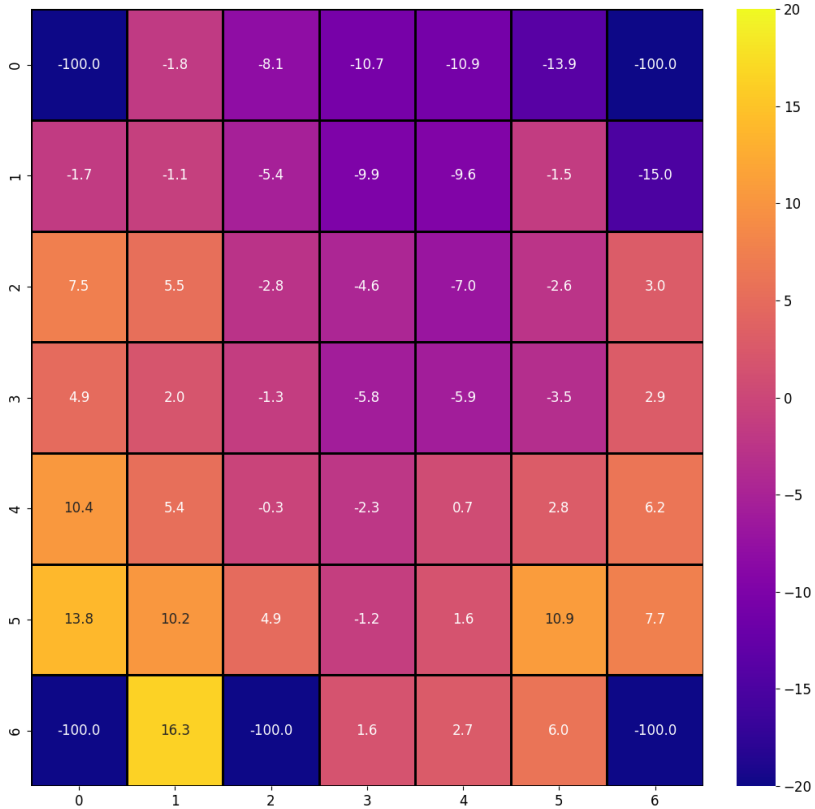
4Sq position

- Space in a 4-fibre square (4Sq) cut in 49x1 mm^2 squares
- Landau x Gaussian fit in each
- 9 (4Sq) can be built
- MPV map can be produced for each
- Fit error in the 1-2% range, can rise to 4% in the corners
- Mean value of each map took as a reference
- Fit with $\chi^2 > 1.1$ are discarded

Uniformity maps 1 out of 5

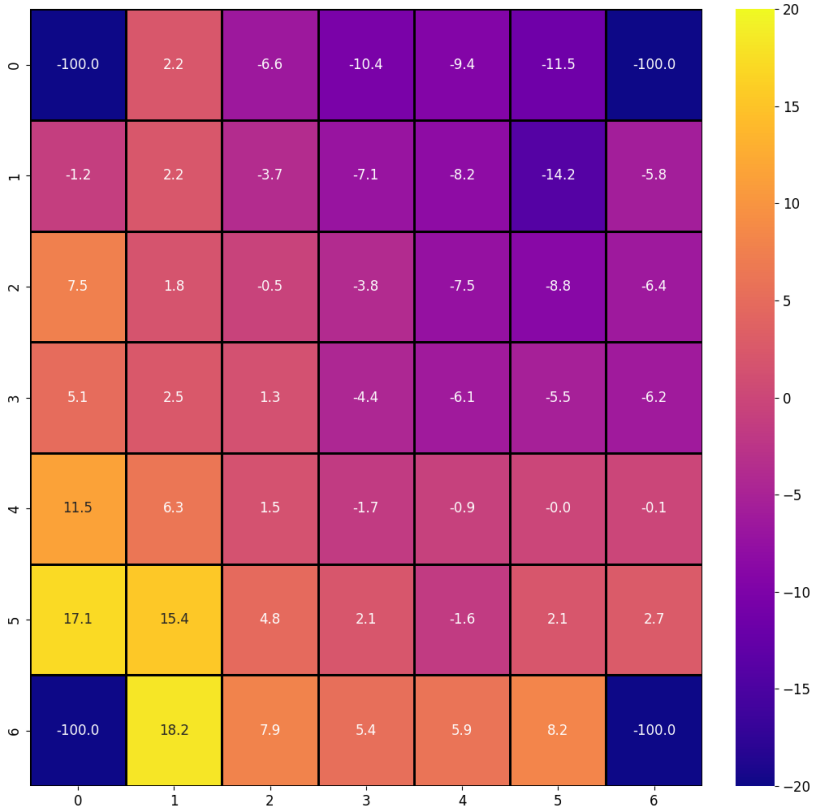


4Sq 0

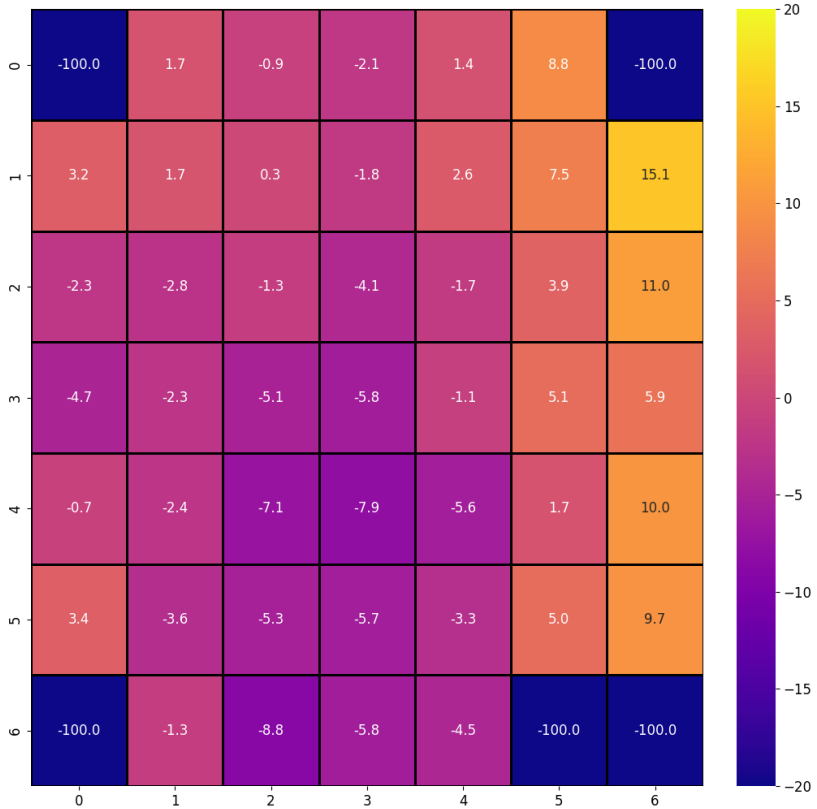


4Sq 1

Uniformity maps 2 out of 5

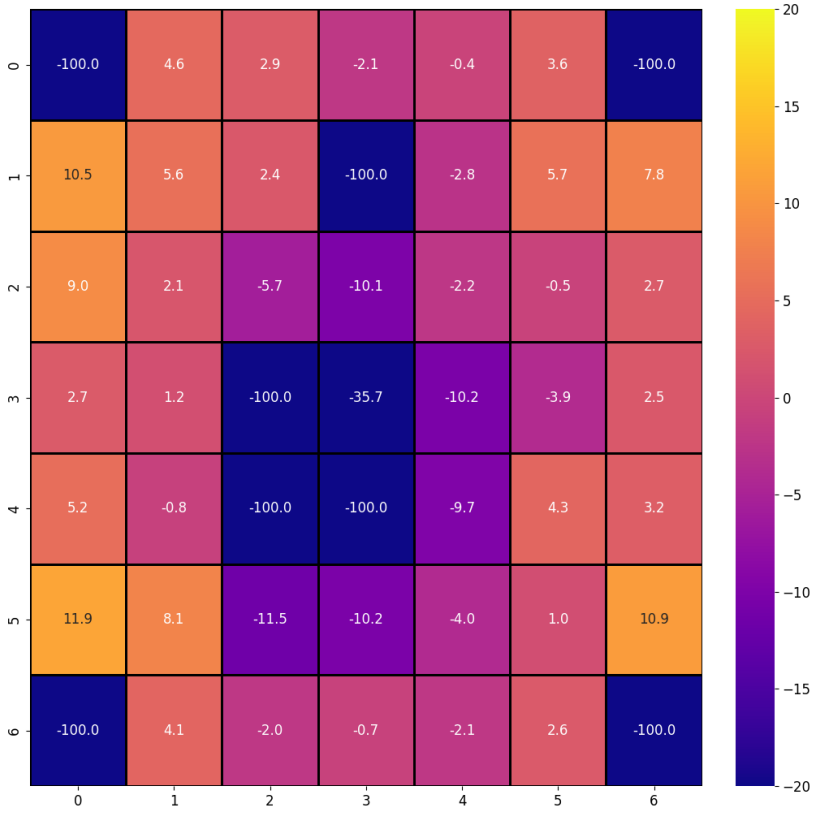


4Sq 2

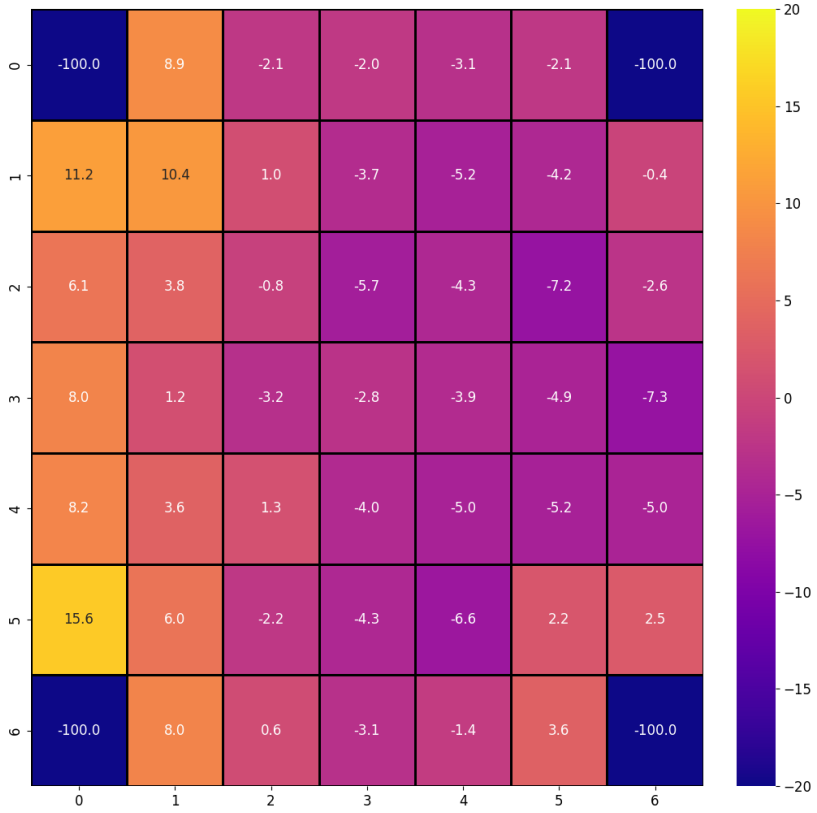


4Sq 3

Uniformity maps 3 out of 5

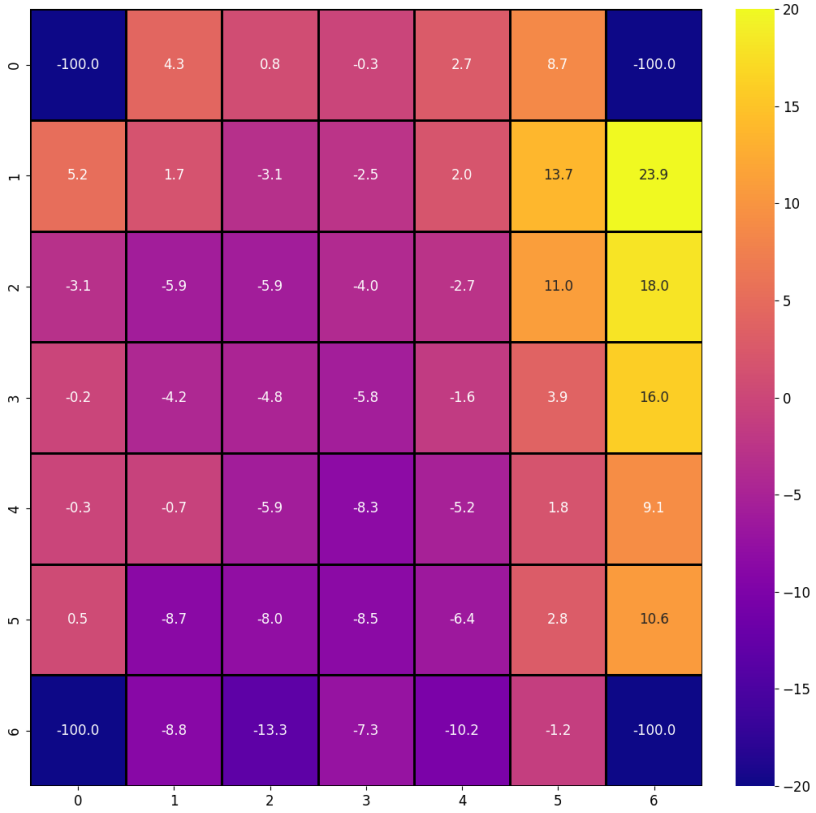


4Sq 4

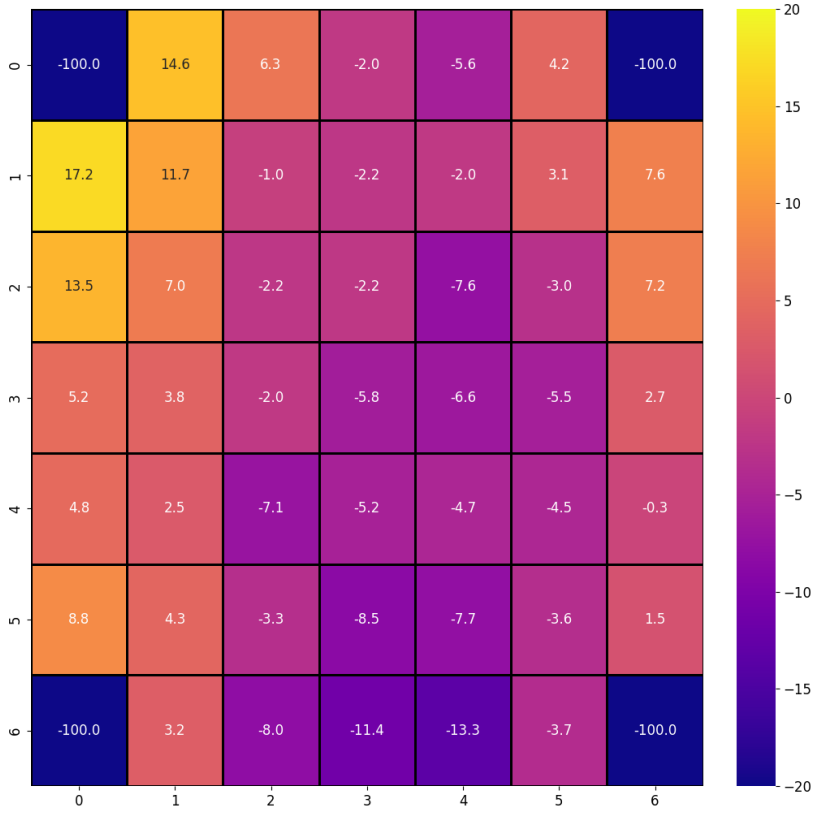


4Sq 5

Uniformity maps 4 out of 5

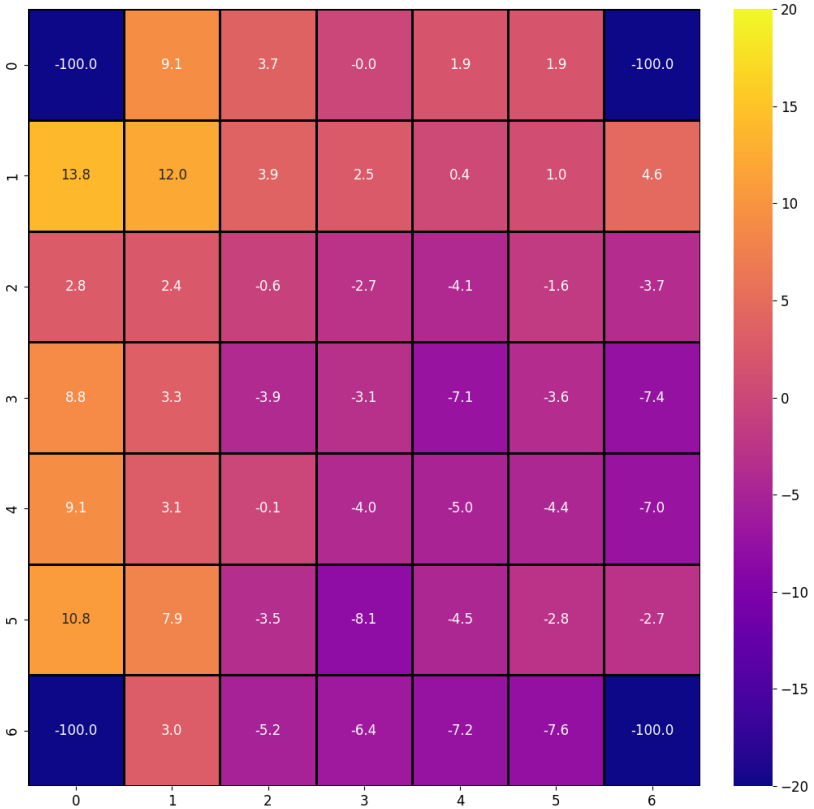


4Sq 6



4Sq 7

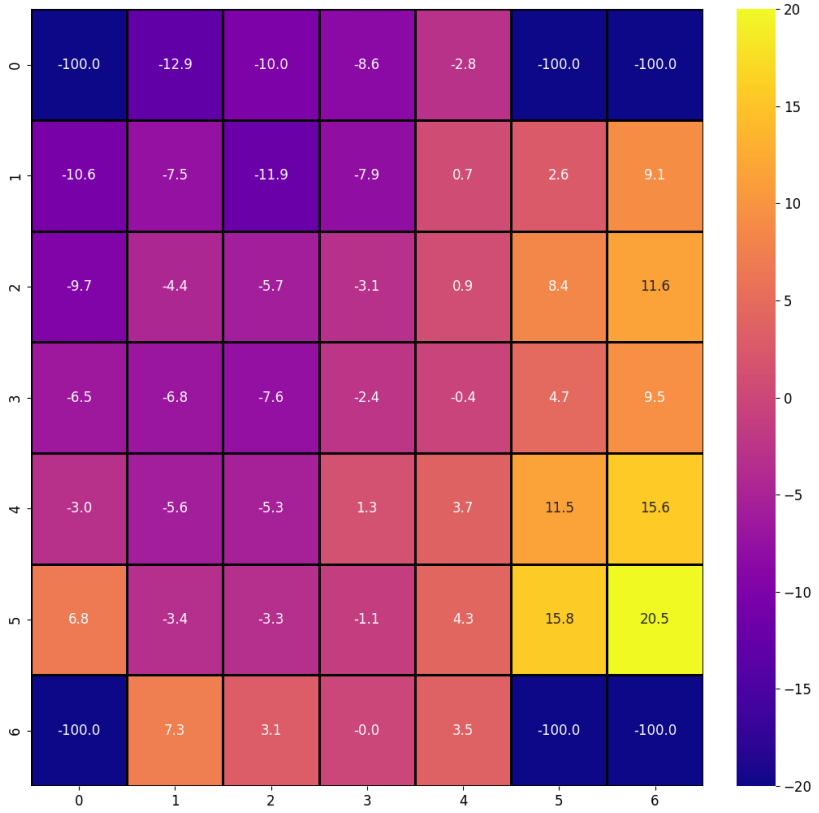
Uniformity maps 5 out of 5



4Sq 8

Interpretation

- The 9 maps are showing departure from uniformity consistently
- Border effect that are likely the explanation
- Maximum of the order of 35 % (in the corners)
- Select region which we think are not plagued by border effect

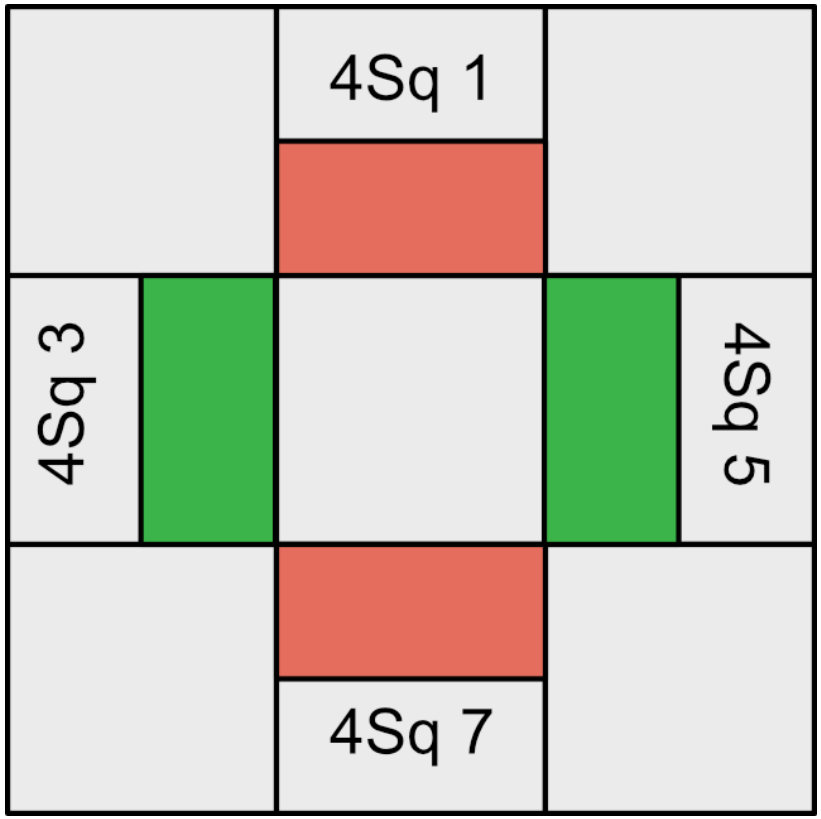


4Sq 0 (corner)

Region location

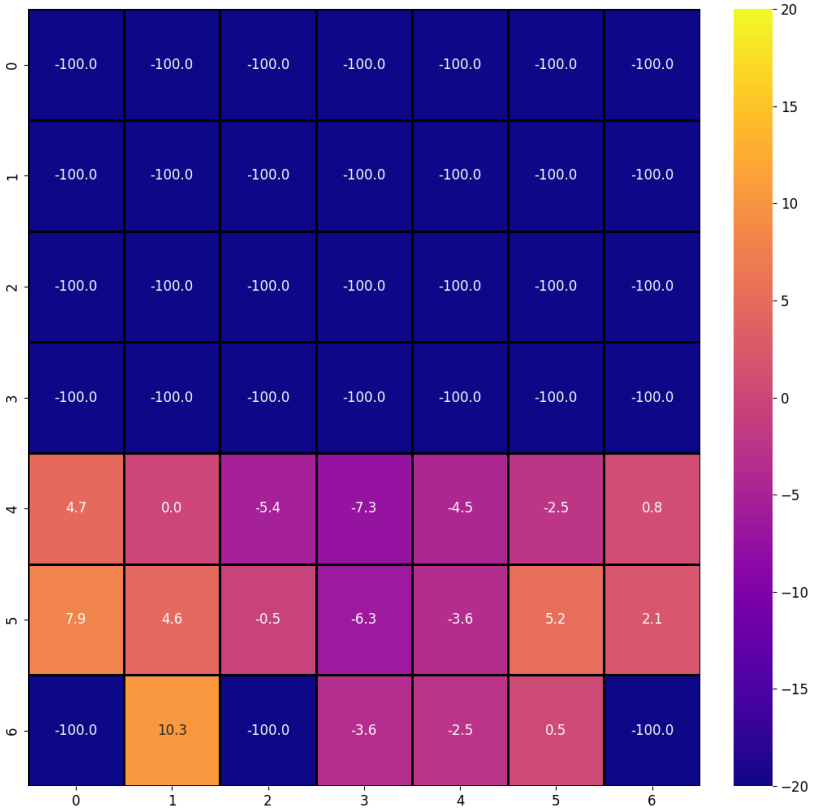
Selection :

- Avoid the clear fibre and minimize the border effects
- Choice of the half blocs located at the vicinity of the center 4Sq 4.

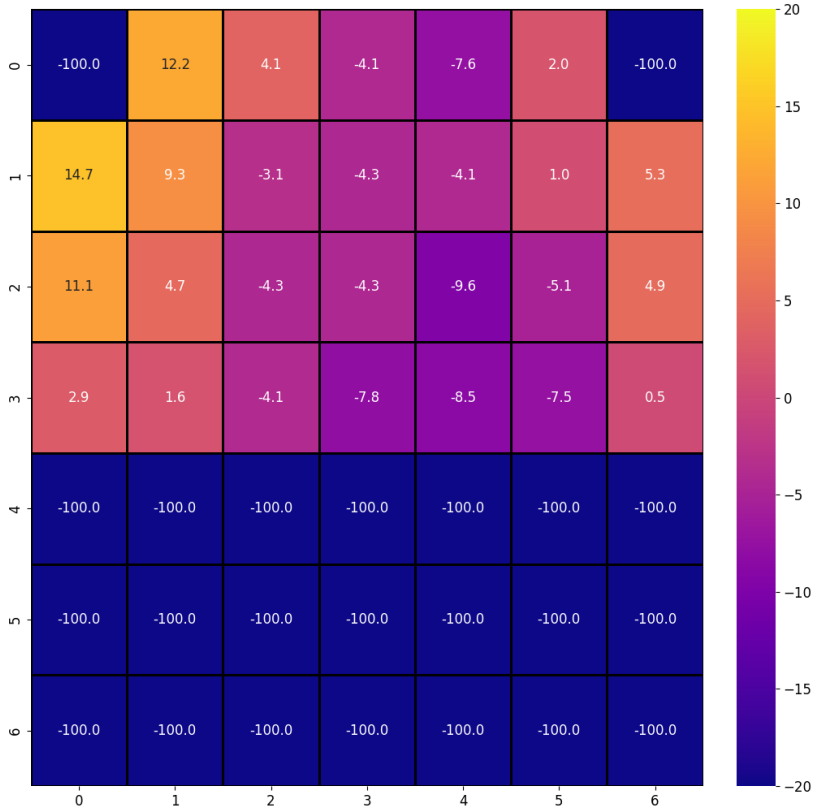


Position of the selected blocs

Uniformity maps 1 out of 2

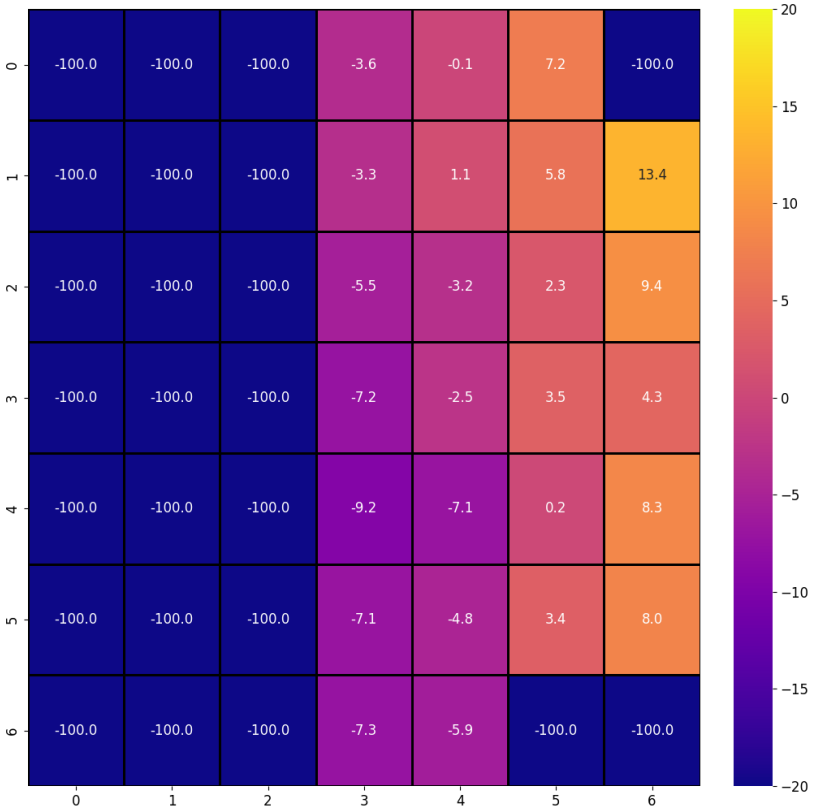


4Sq 1

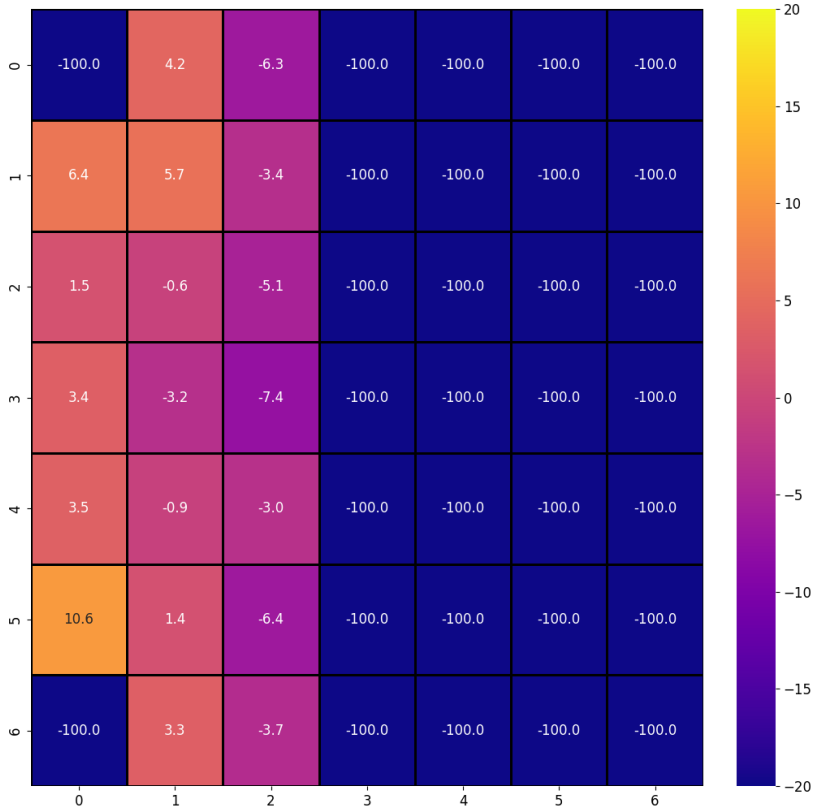


4Sq 7

Uniformity maps 2 out of 2



4Sq 3

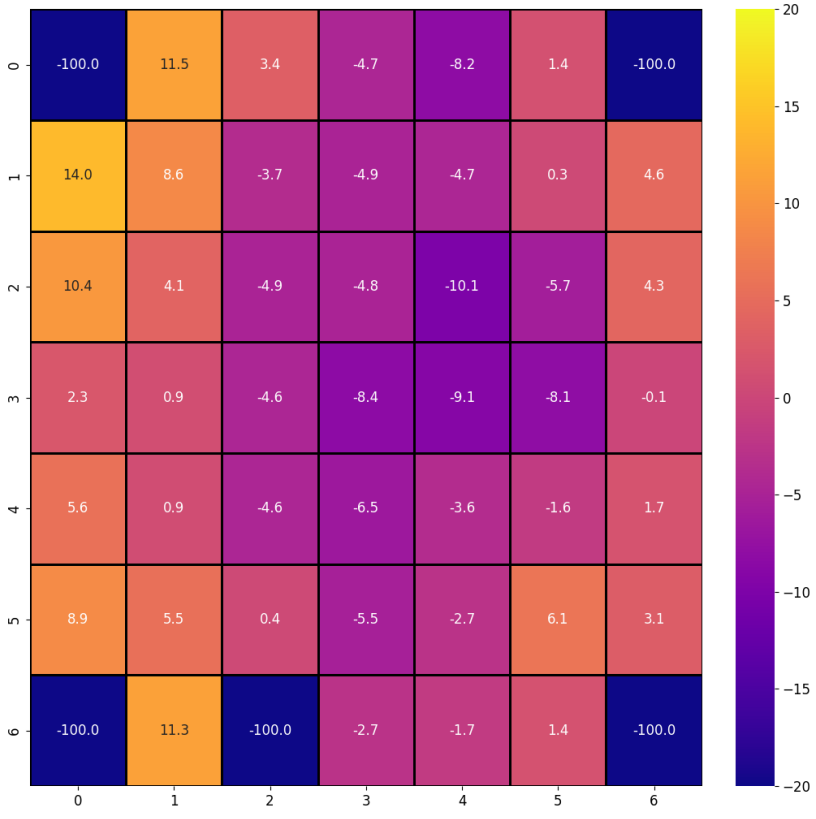


4Sq 5

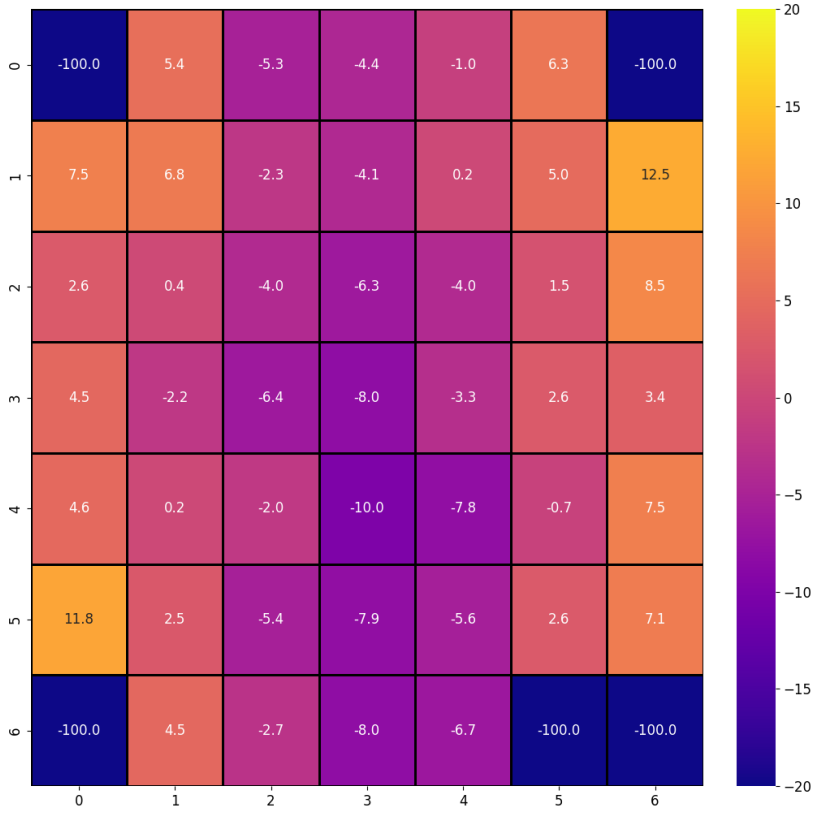
Proposal

- Is there a way to present this result in a unique way to input into Denys simulation.
- Our proposal : merge the previous plot

Final result ?



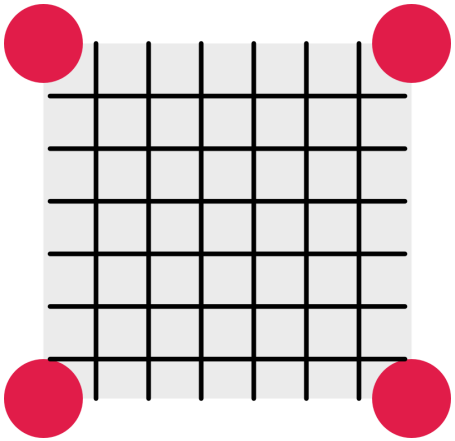
4Sq 1-7



4Sq 3-5

IV. Uniformity map 2

Geometry



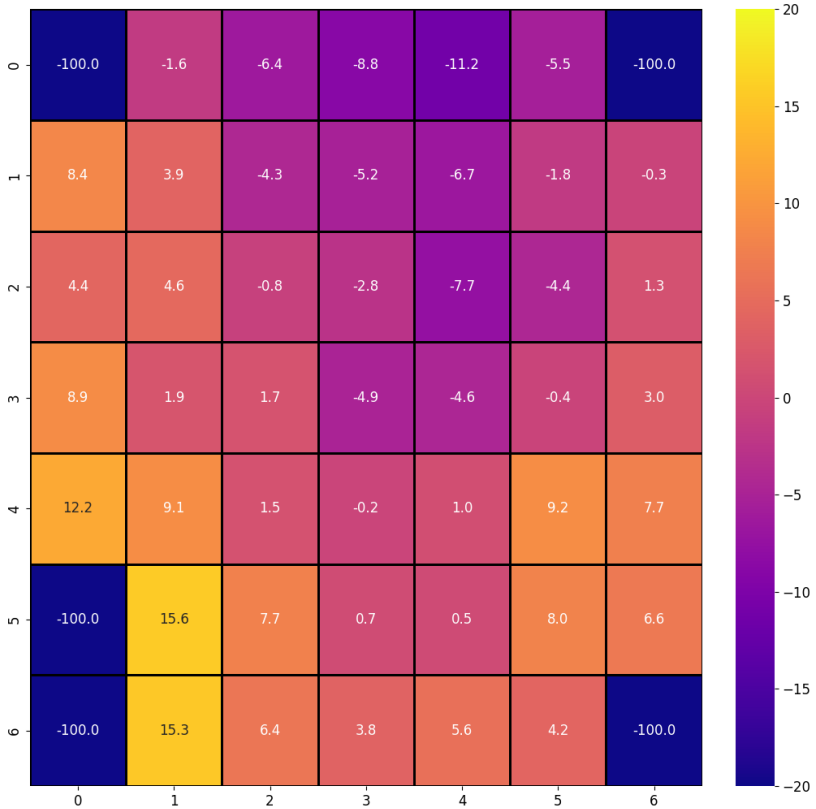
4Sq definition

4Sq 0	4Sq 1	4Sq 2
4Sq 3	4Sq 4	4Sq 5
4Sq 6	4Sq 7	4Sq 8

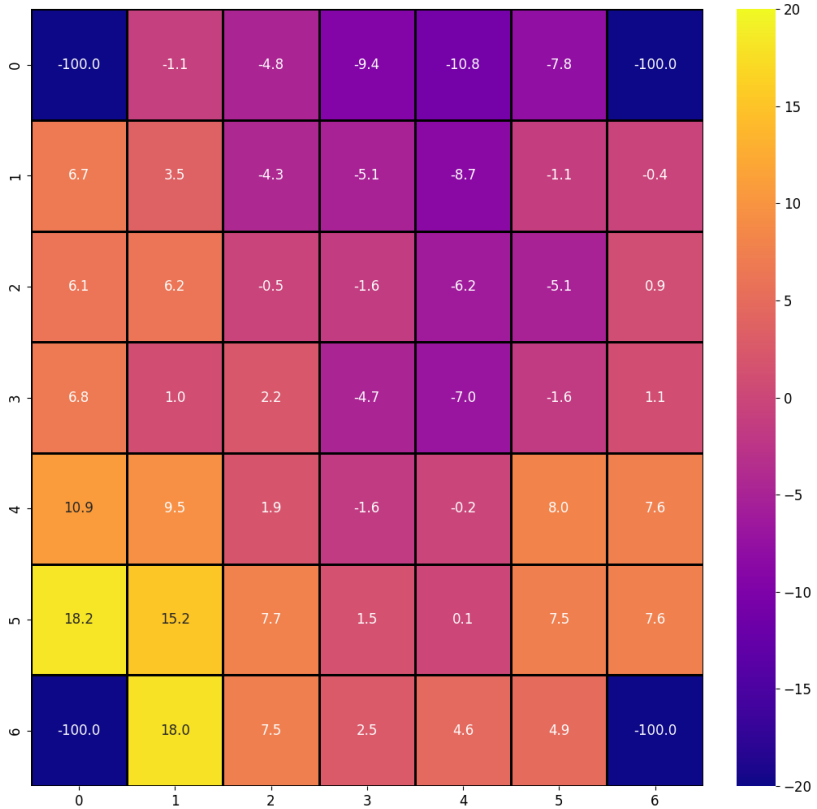
4Sq position

- Space in a 4-fibre square (4Sq) cut in 49x1 mm^2 squares
- In the last map, the lower left corner was took as a reference and a 7x7 mm square was built
- In the next slides, took each of the four corner to have an idea of the sys. errors associated
- One can think at others methods (take the middle for ex.)
- Fit with $\chi^2 > 1.2$ are discarded

4Sq 1

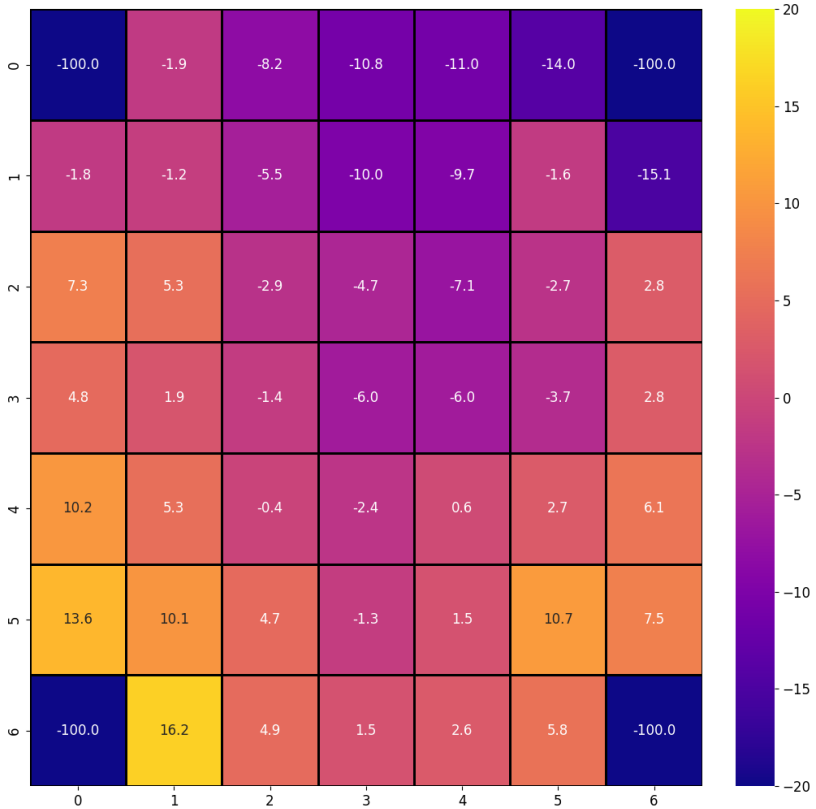


4Sq F3

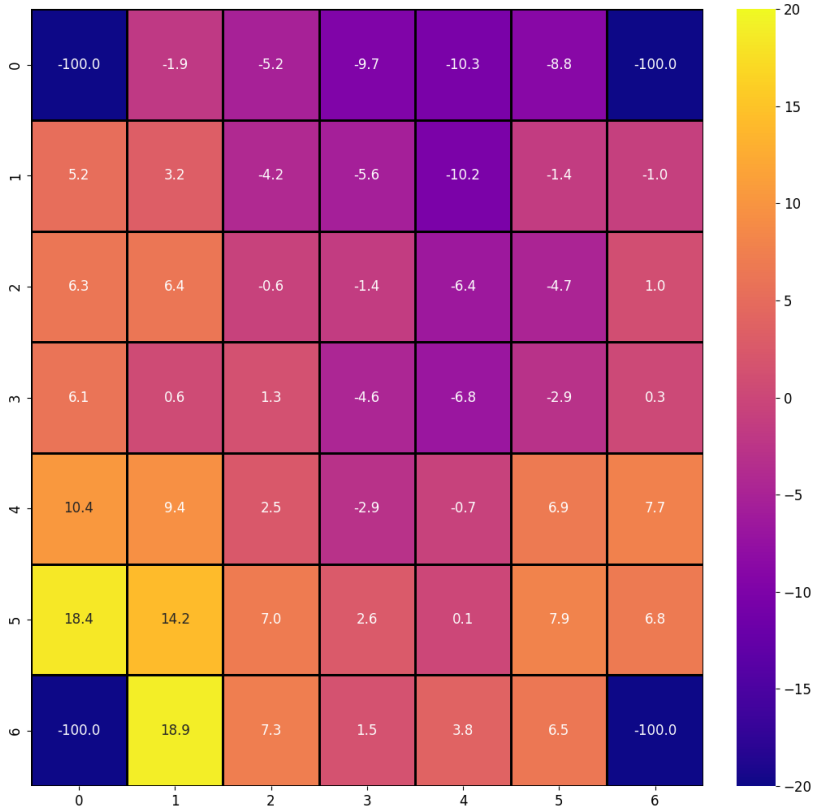


4Sq F0

4Sq 1

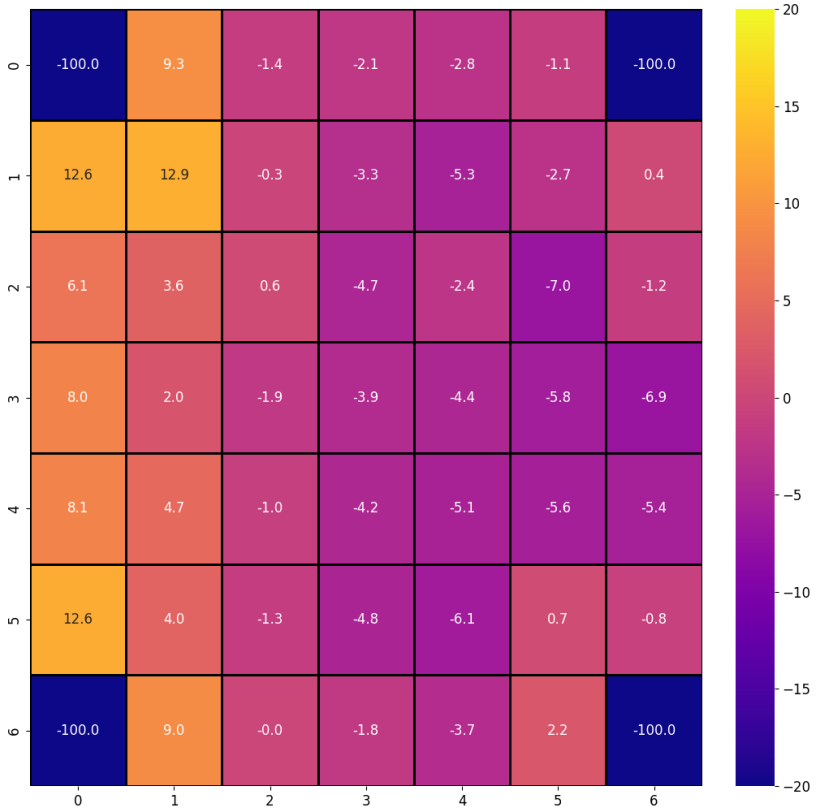


4Sq F7

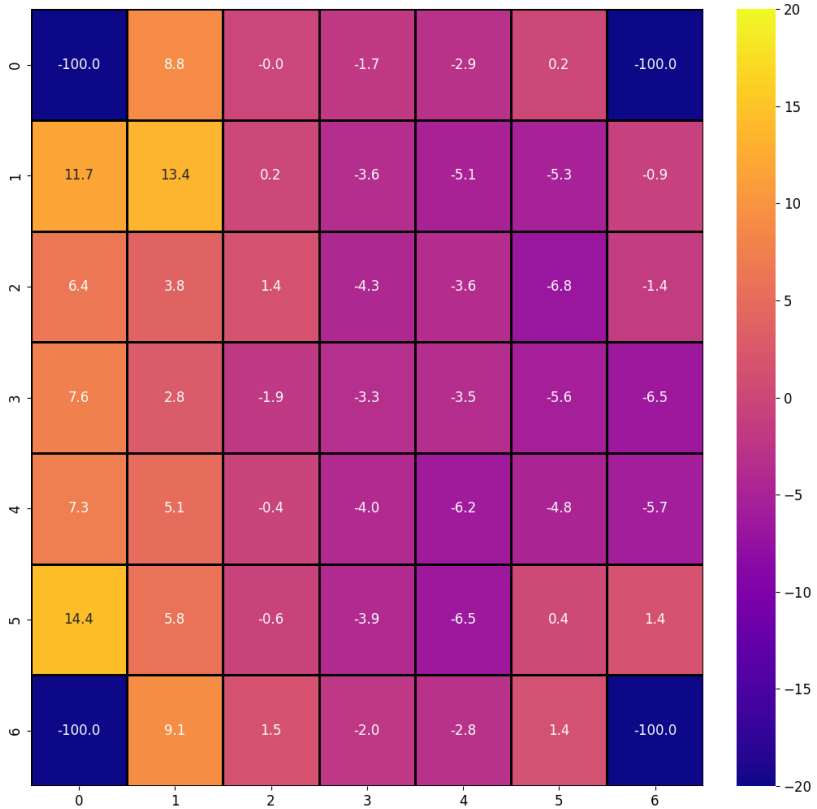


4Sq F4

4Sq 5

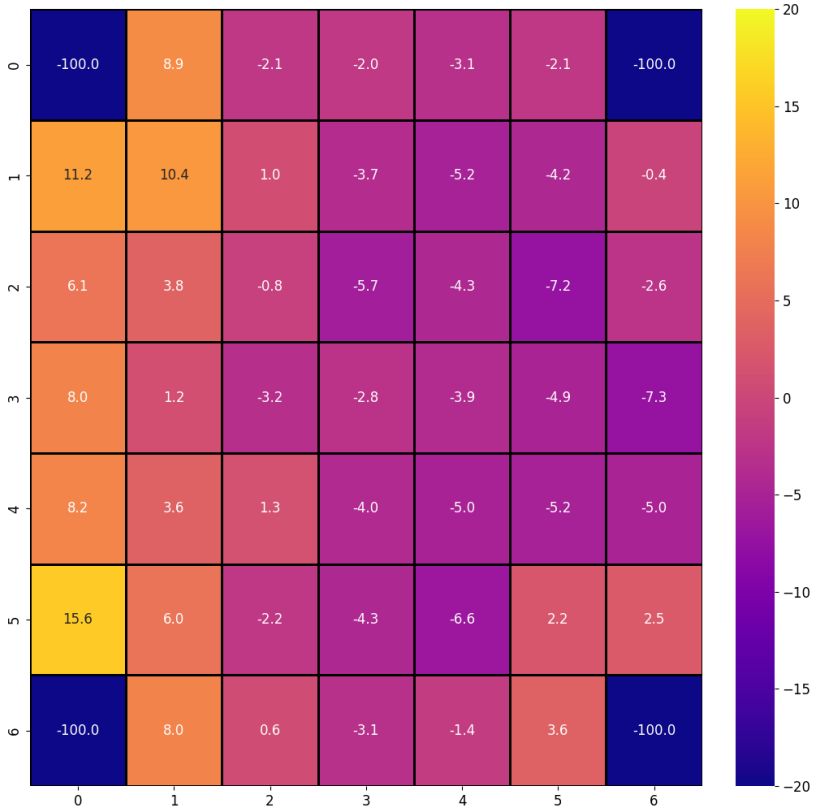


4Sq F3

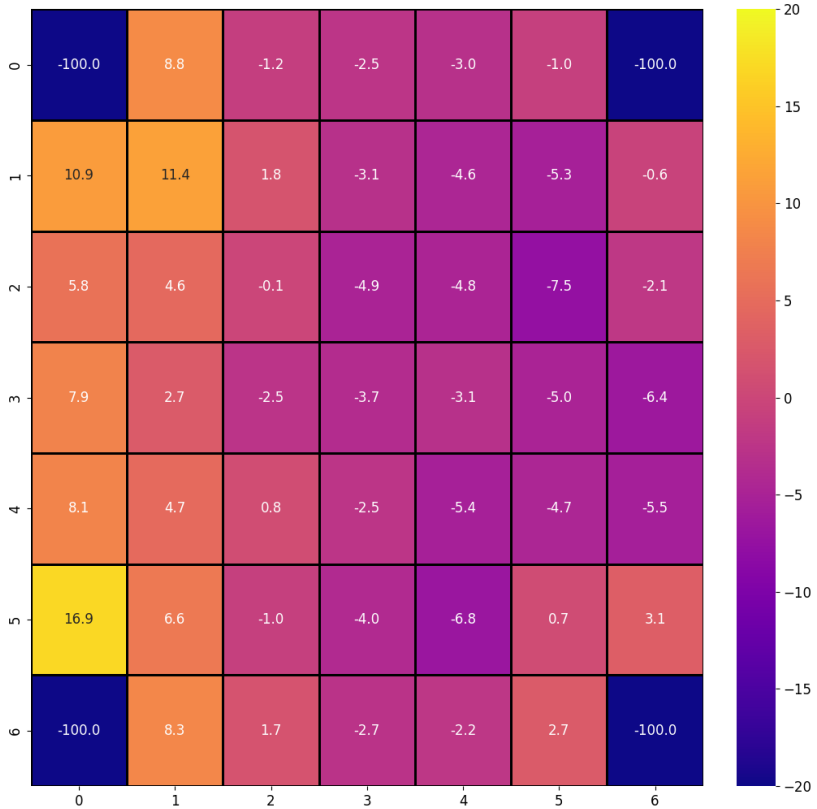


4Sq F0

4Sq 5

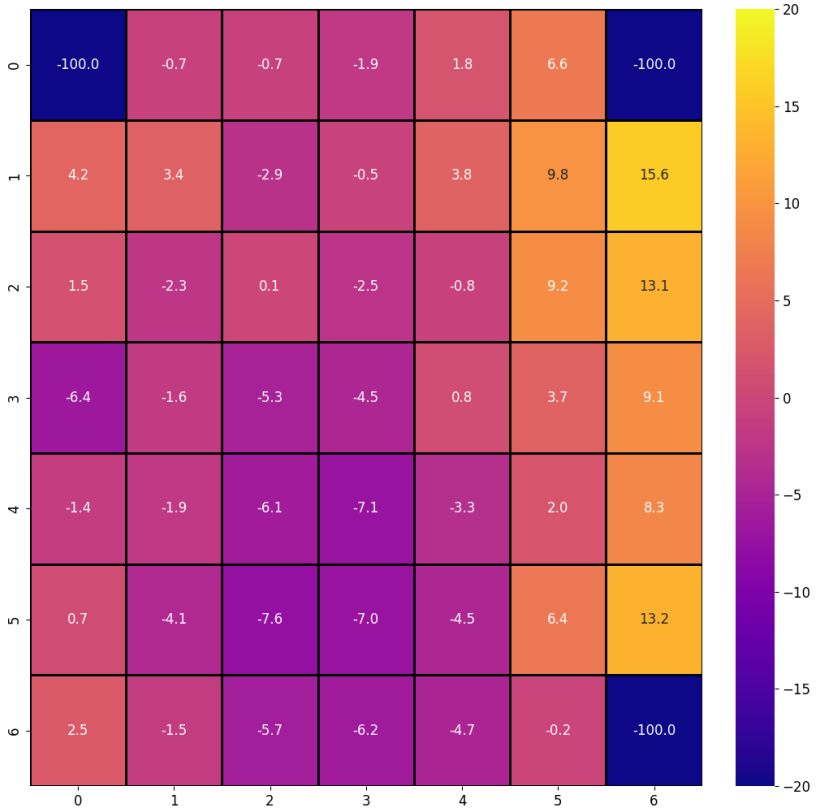


4Sq F7

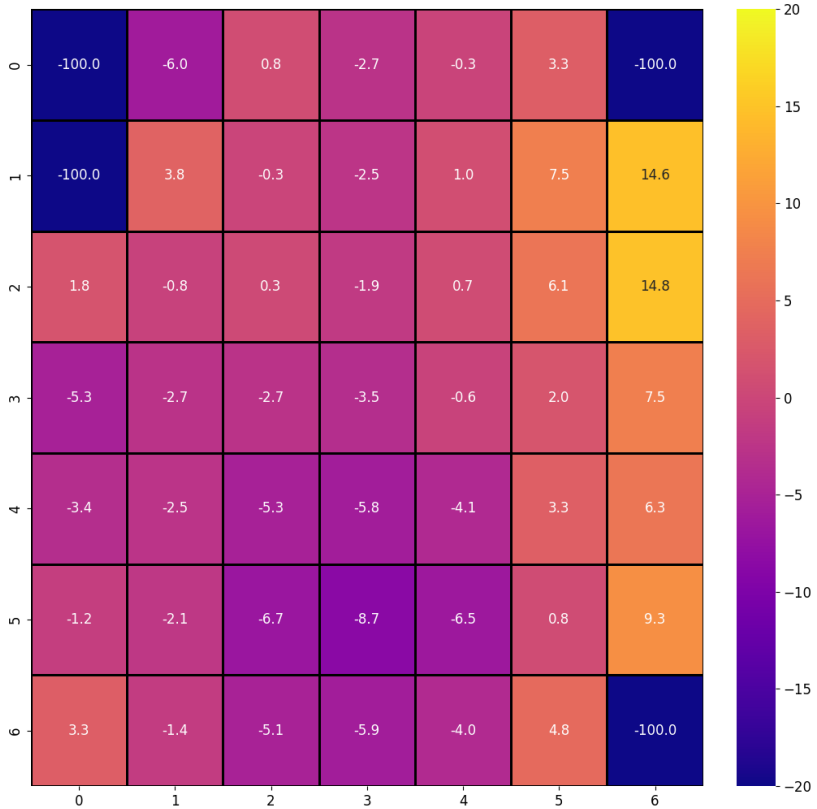


4Sq F4

4Sq 3

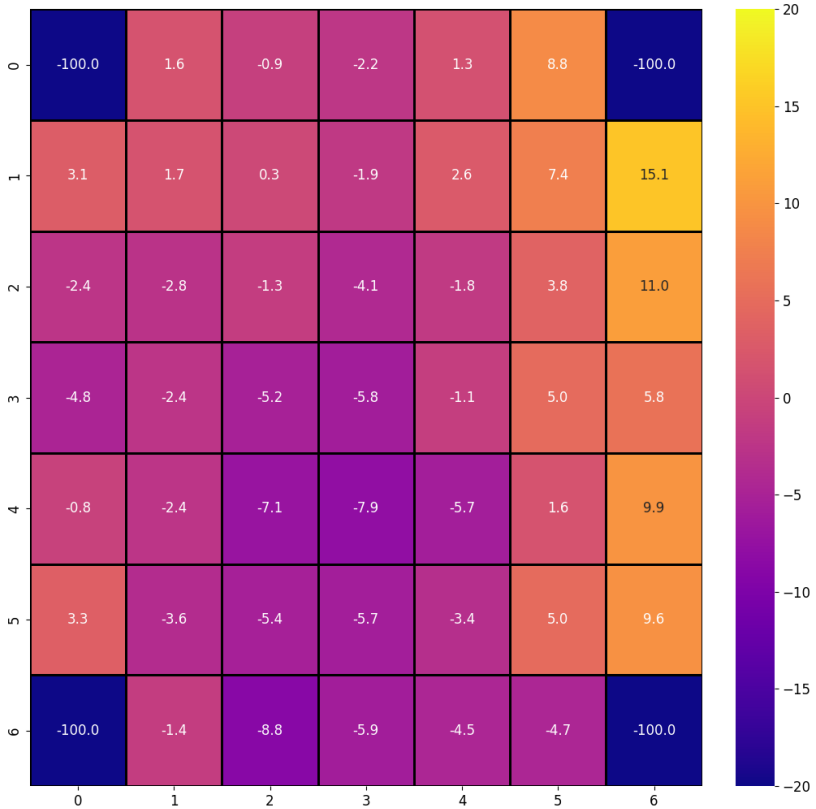


4Sq F6

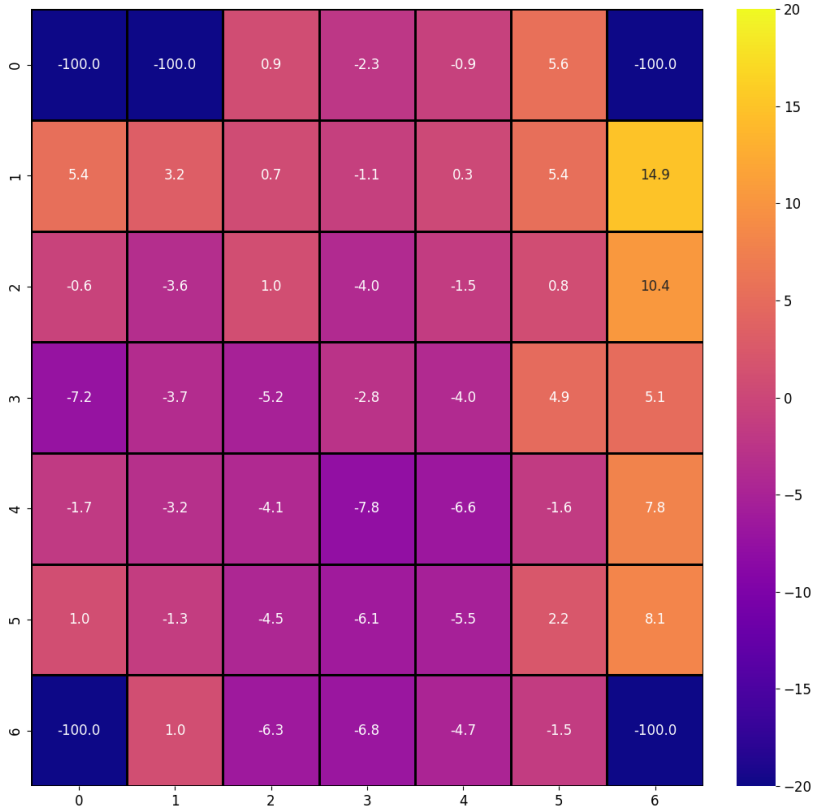


4Sq F7

4Sq 3

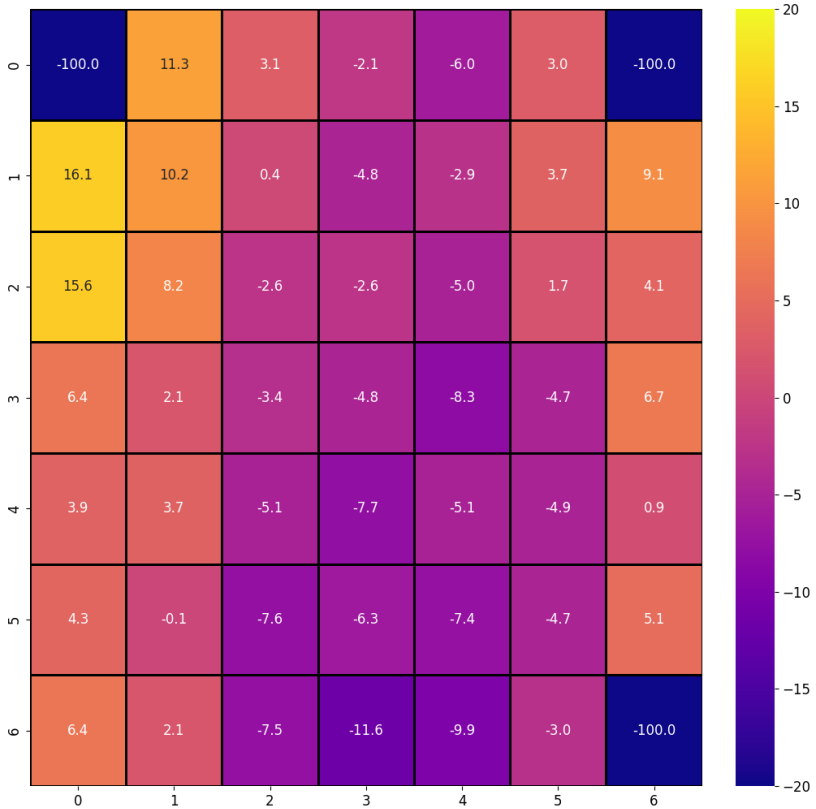


4Sq F10

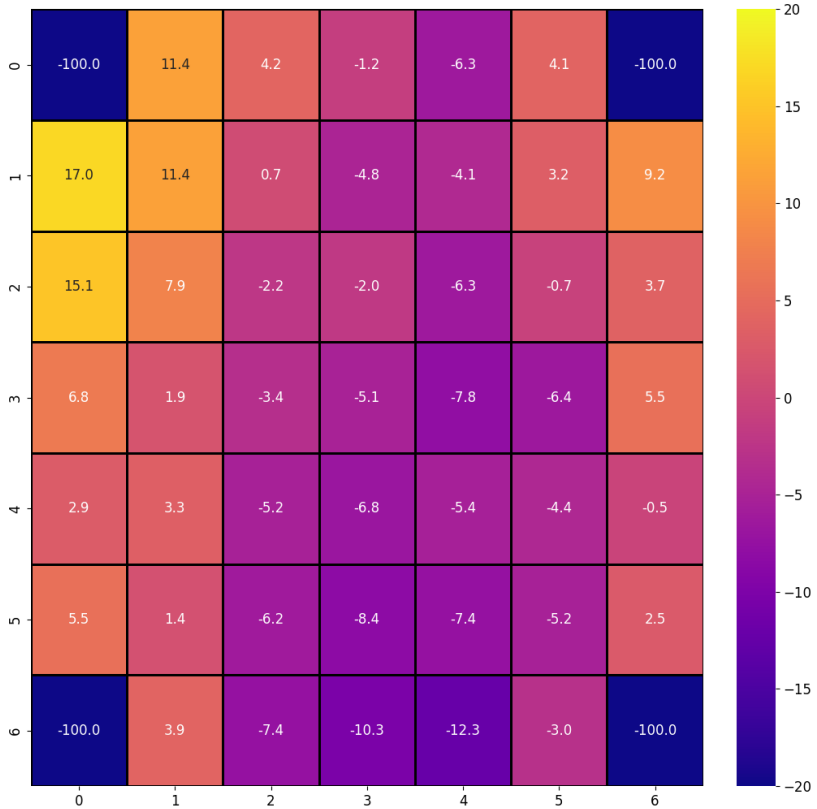


4Sq F11

4Sq 7

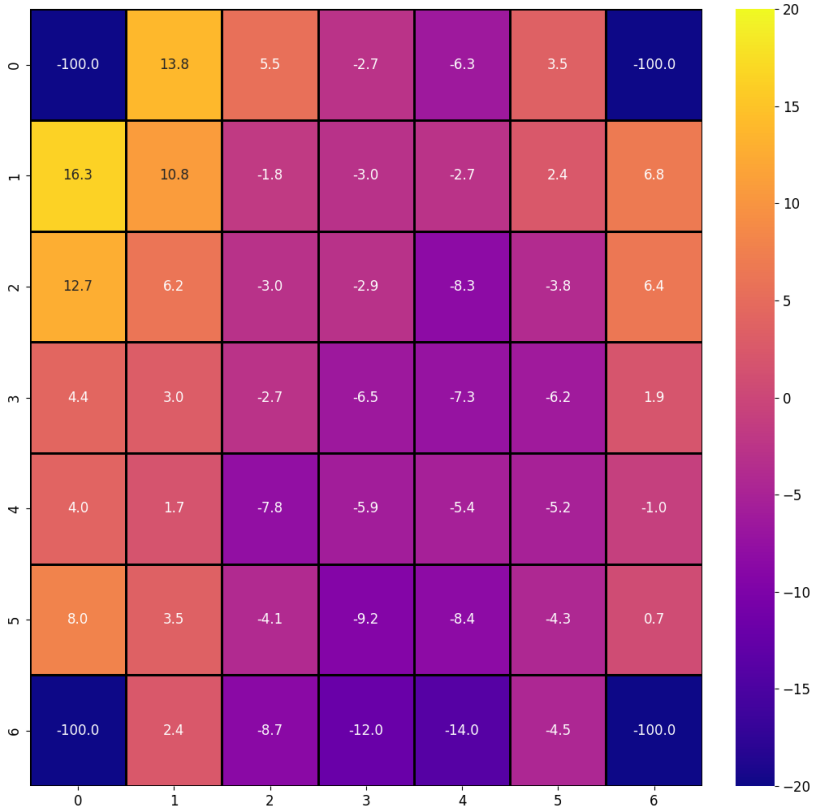


4Sq F11

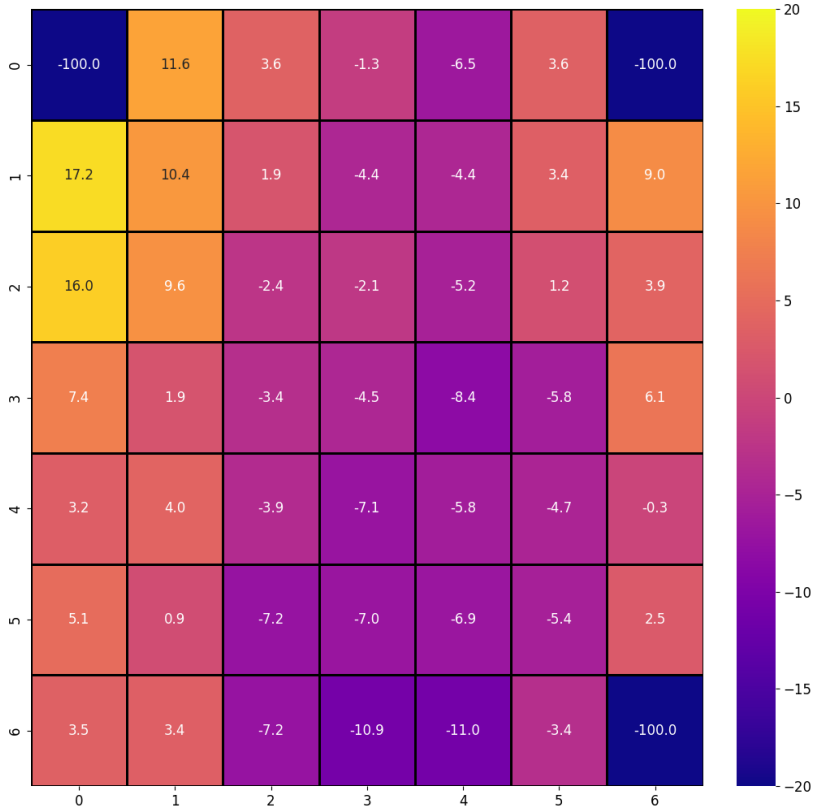


4Sq F8

4Sq 7



4Sq F10

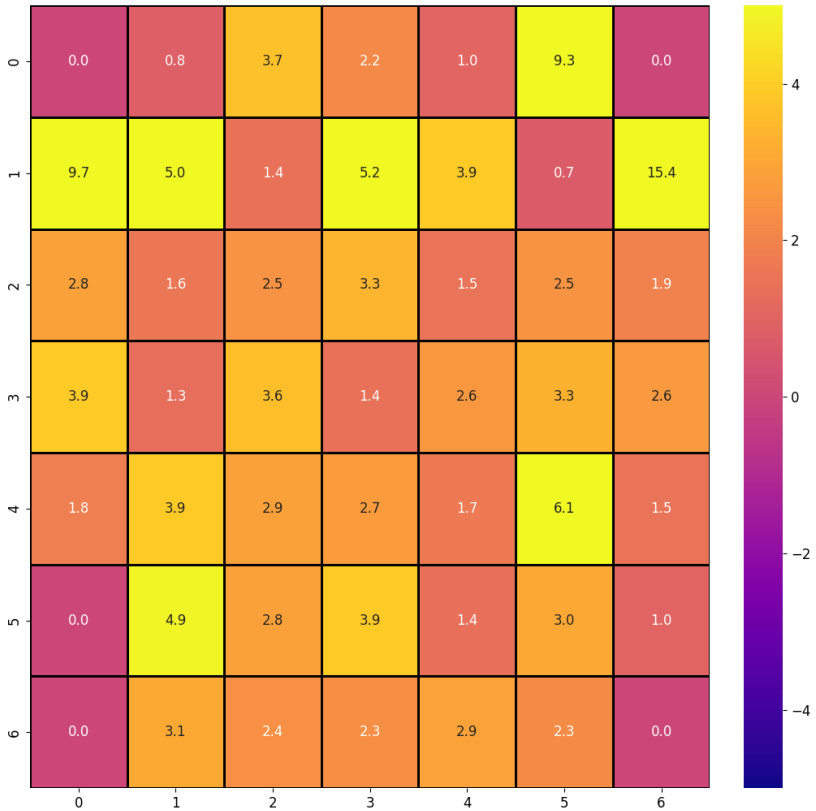


4Sq F11

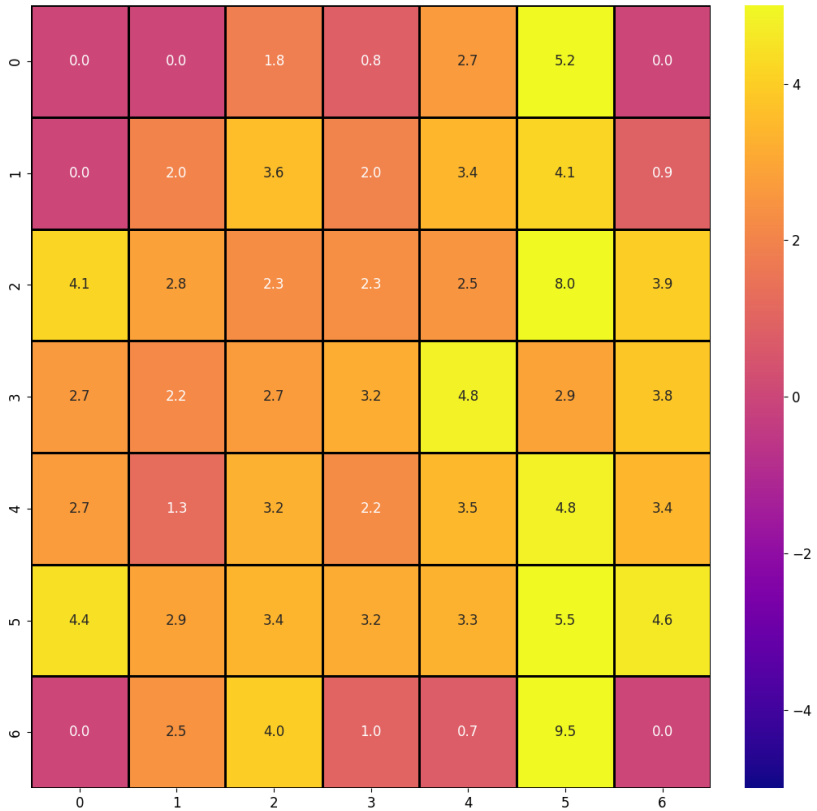
Systematics

Defined as :

$$S = \frac{min - max}{mean} \quad (1)$$



4Sq 1

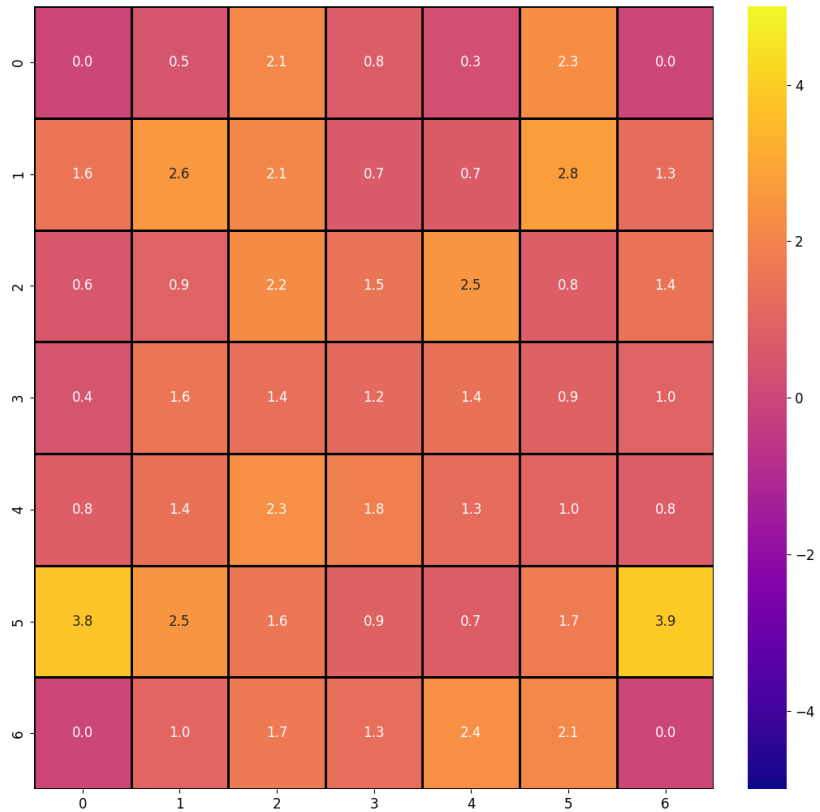


4Sq 3

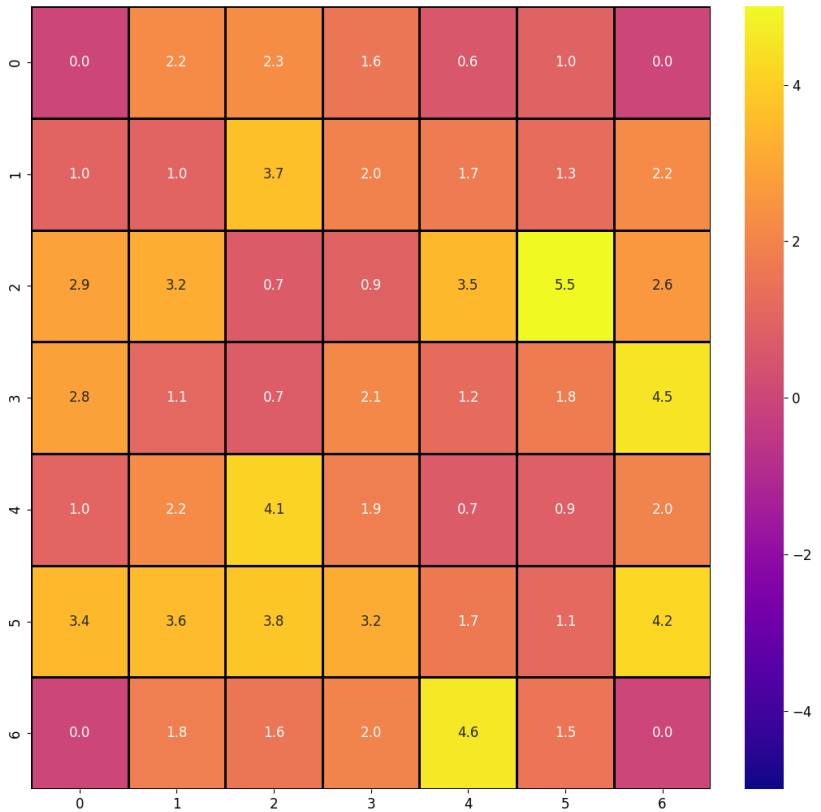
Systematics

Defined as :

$$S = \frac{min - max}{mean} \tag{2}$$



4Sq 5



4Sq 7

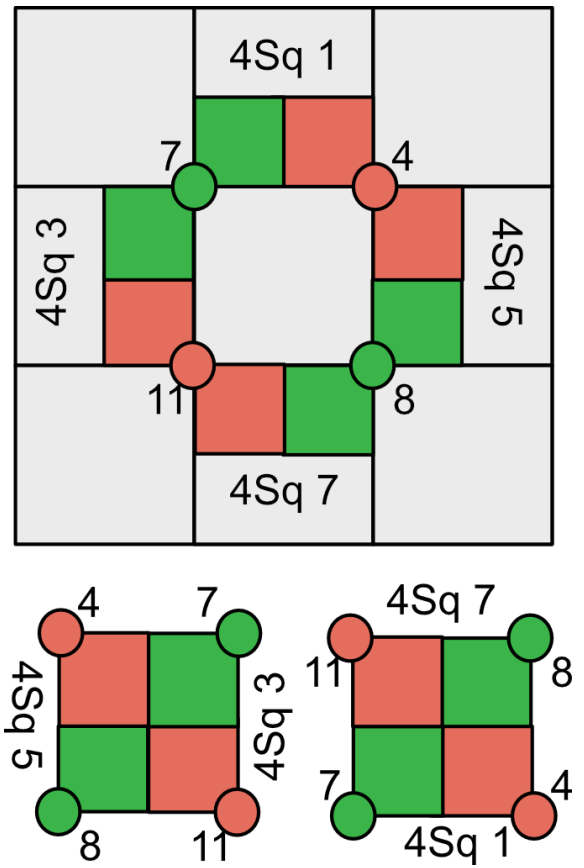
Region location 2

Selection :

- A few % difference with the choice of the definition on the fibre (syst. error)
- New uniformities map can be produced, as an example :

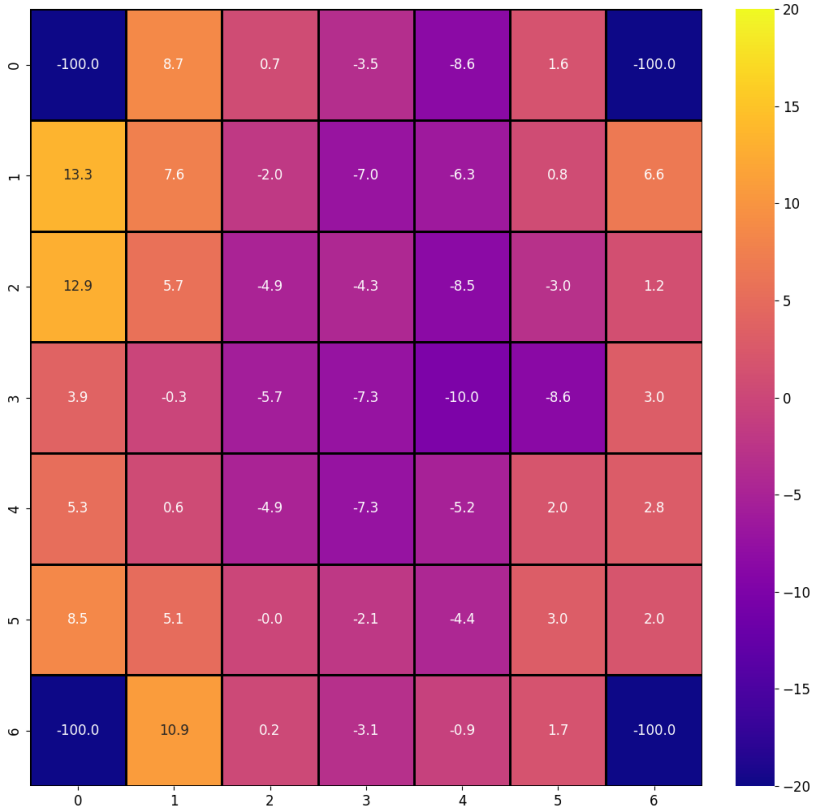
← Using quarters and selecting the nearest fibre

← Arbitrary choose one quarter in the middle squares

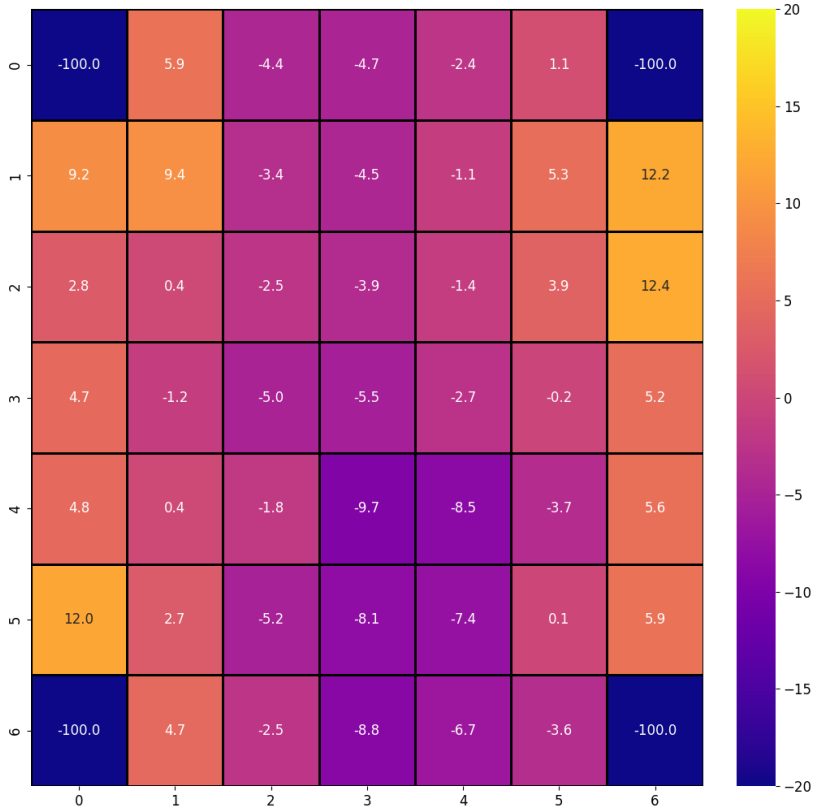


Position of the selected blocs

Not so-final result 2



4Sq 1-7



4Sq 3-5