

# 1 Benchamrk week 5

Context:  $30 \times 15$  SC with open boundary conditons.

We have a phase gradient of  $117^\circ$ . Starting from  $\pi/2$ .  $T = 10^{-3}K$  and we iterrate until a relative change in both the real and imaginary part of  $\Delta$  reach 0.001%.

The way matlab deals with the eigenvectors and eigenvalues seams strange. So if we take  $\chi_n$  along with  $E_n$  like the theory does, the algorithm dosnt converge for:

## 1. Real guess of $\Delta$ and all parameters are free

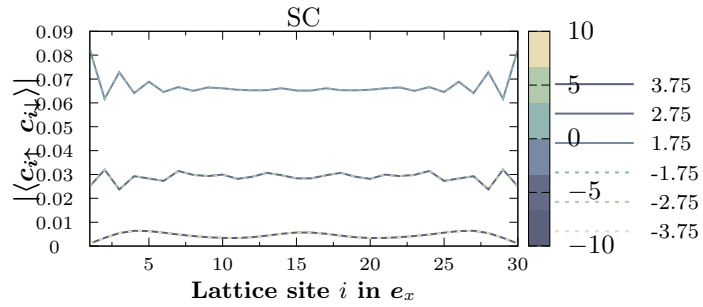


Figure 1

From this we can read the following parameters:  $\mu = \pm 1.75 - > 0.0651$ ,  $\mu = \pm 2.75 - > 0.02836$ ,  $\mu = \pm 3.75 - > 0.00568$ .

## 2. Fixed norm of $\Delta$ on the side according to 1.

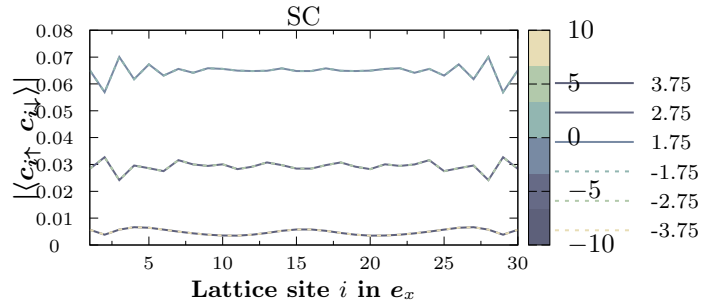
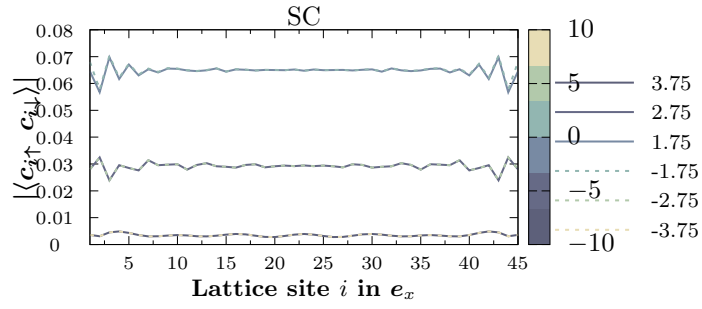


Figure 2

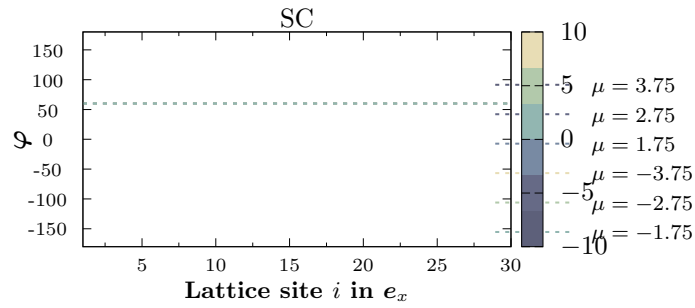
And we try with a longer SC to try to minimise the fluctuations.



**Figure 3**

Until now everything works as expected :) so we can stick with the model of SC30 which is faster to compute.

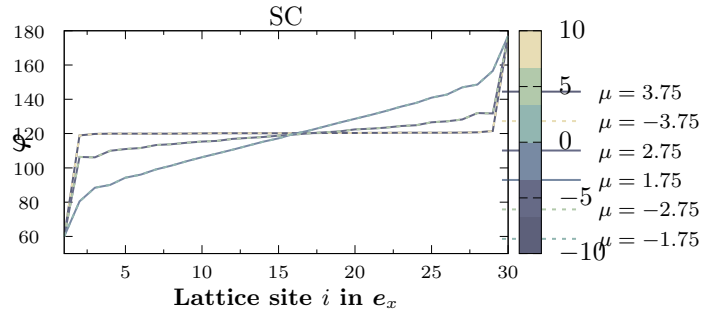
### 3.Fixed $|\Delta_0|$ and a phase of $\pi/3$ on the sides.



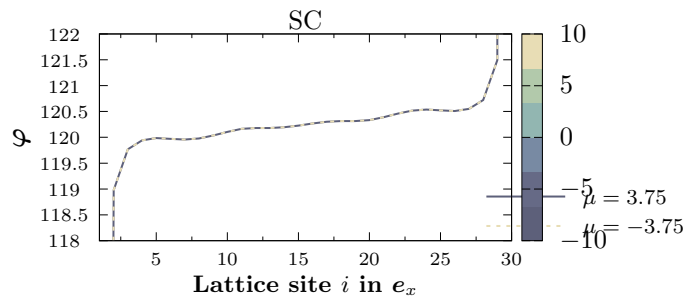
**Figure 4:** using a start of  $\pi/3$  on the sides

The algorithm doesn't seem to converge and the relative change sattles at 0.00285%.

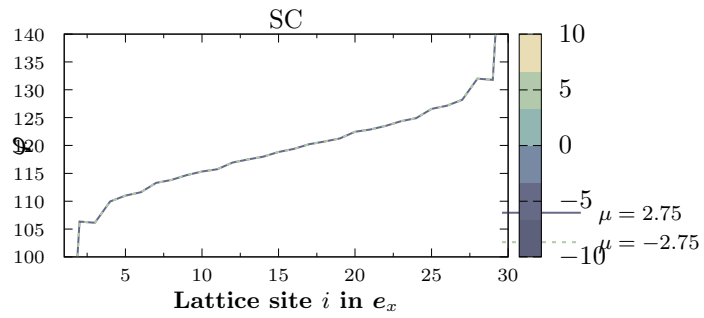
### 4.Fixed phase of $\pi/3$ on the sides left and a gradient of $117^\circ$ .



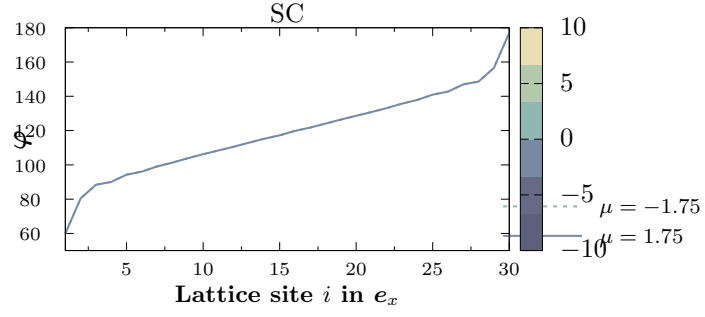
**Figure 5:** using a start of  $\pi/3$  on the sides



**Figure 6:** using a start of  $\pi/3$  on the sides.

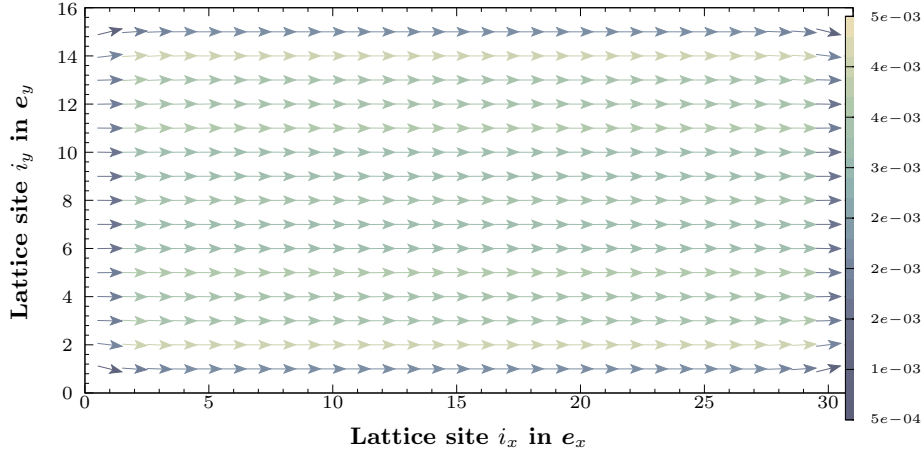


**Figure 7:** using a start of  $\pi/3$  on the sides.

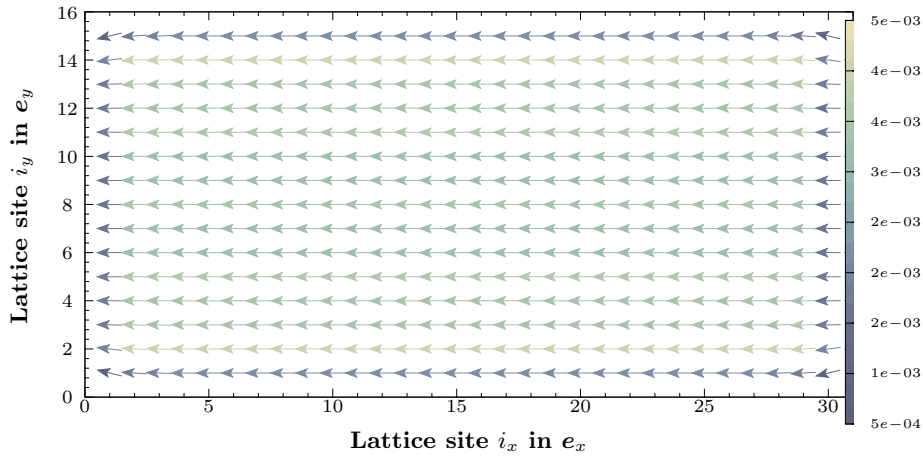


**Figure 8:** using a start of  $\pi/3$  on the sides.

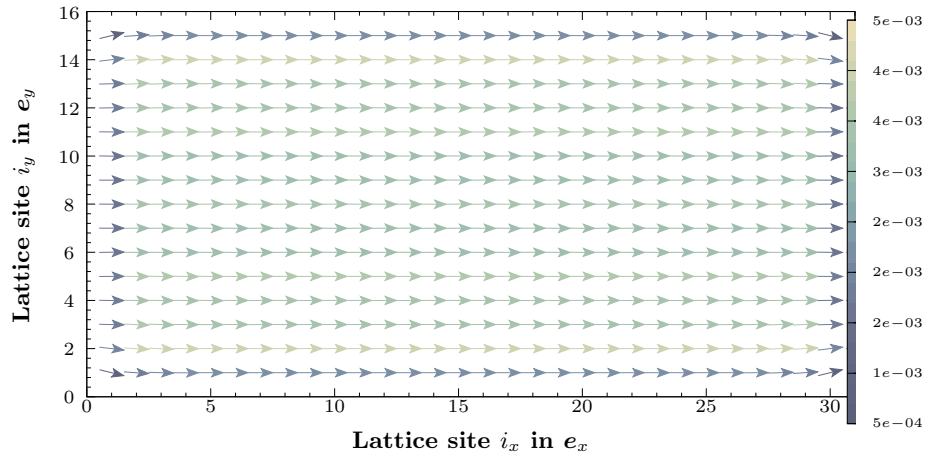
And the current map:



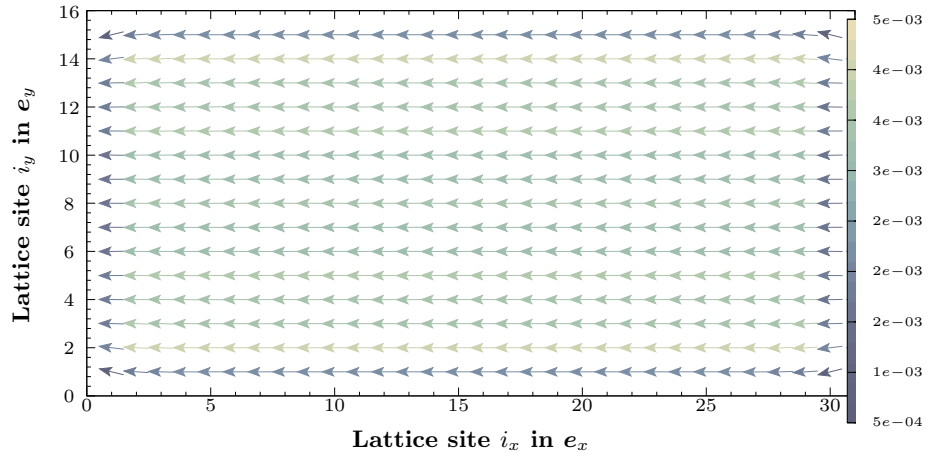
**Figure 9:** using a start of  $\pi/3$  on the sides. V1  $\mu = 2.75$ .



**Figure 10:** using a start of  $\pi/3$  on the sides. V2  $\mu = 2.75$ .

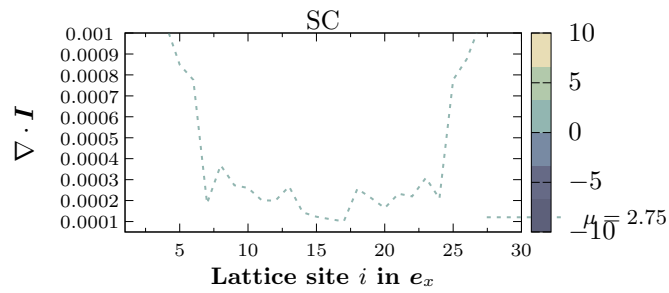


**Figure 11:** using a start of  $\pi/3$  on the sides. V1  $\mu = -2.75$ .

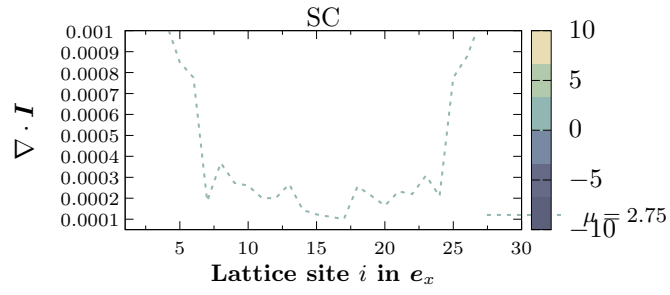


**Figure 12:** using a start of  $\pi/3$  on the sides. V2  $\mu = -2.75$ .

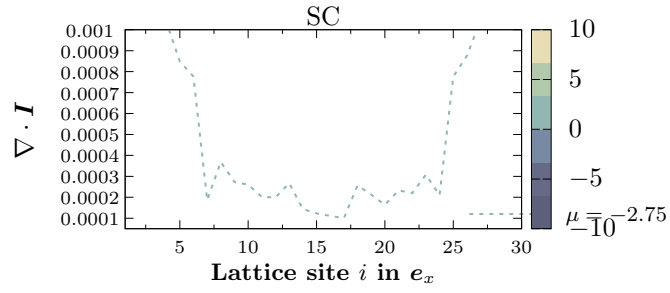
And the continuity maps:



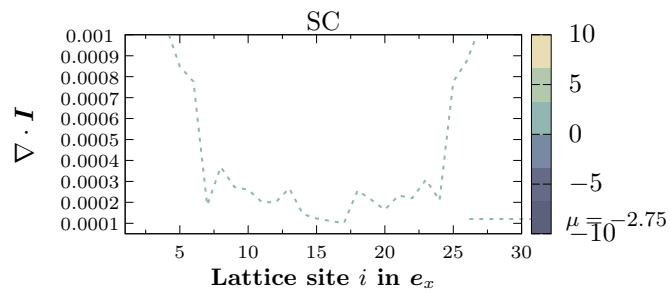
**Figure 13:** using a start of  $\pi/3$  on the sides. V1  $\mu = 2.75$ .



**Figure 14:** using a start of  $\pi/3$  on the sides. V2  $\mu = 2.75$ .



**Figure 15:** using a start of  $\pi/3$  on the sides. V1  $\mu = -2.75$ .



**Figure 16:** using a start of  $\pi/3$  on the sides. V2  $\mu = -2.75$ .