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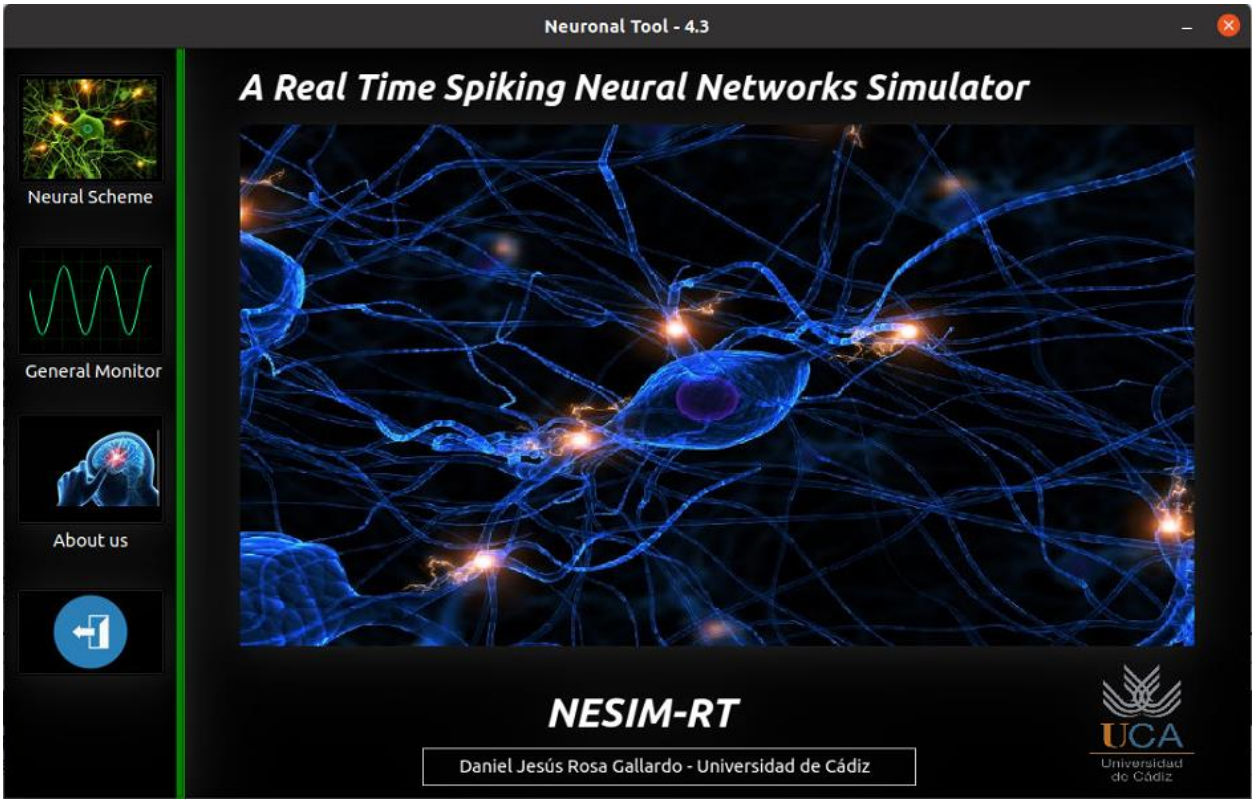
Juan Andrés Herrera Rodríguez

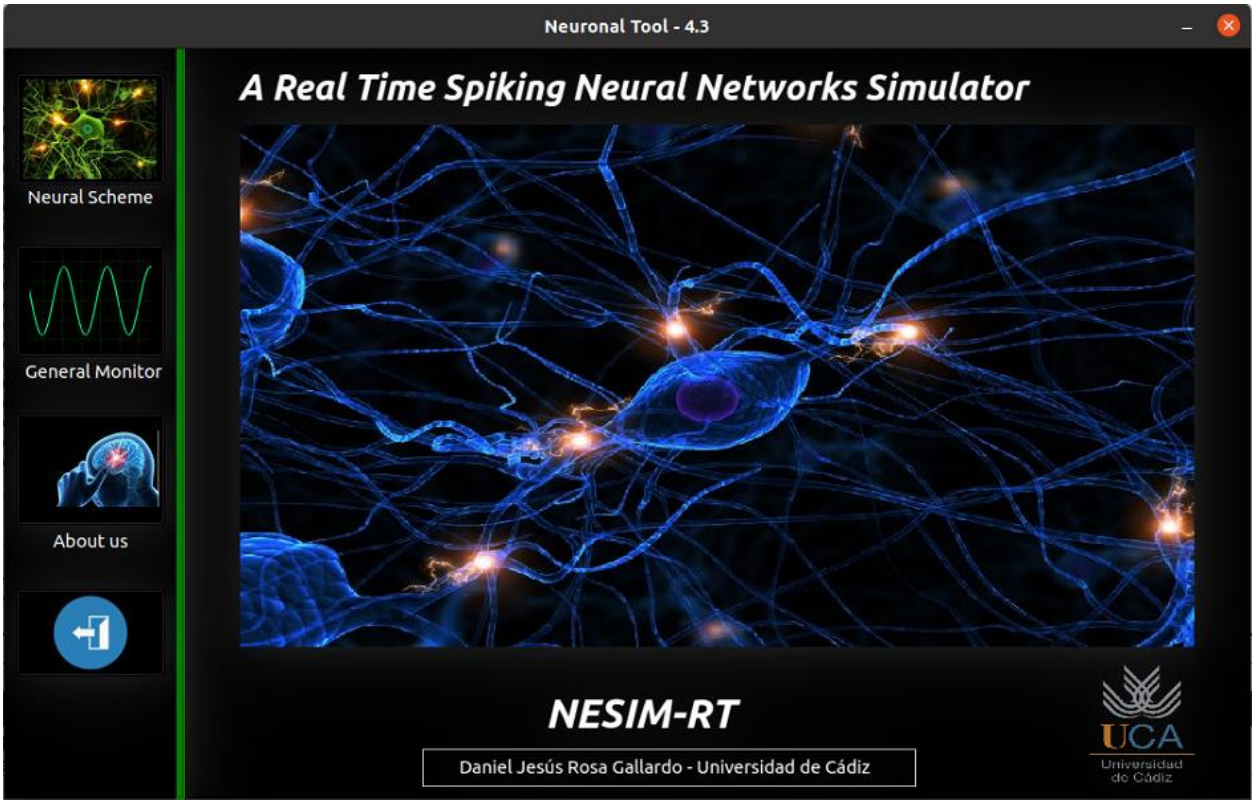
User manual
NESIM-RT Simulator

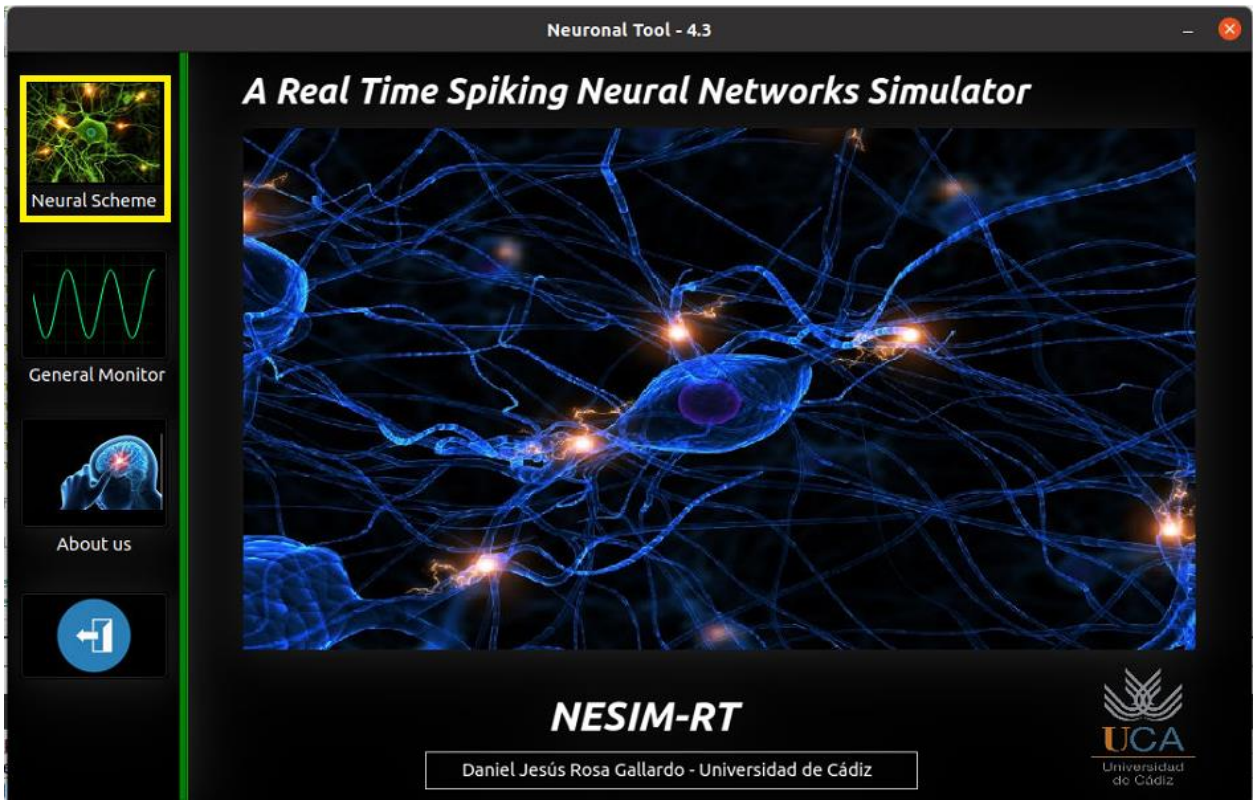


Introduction

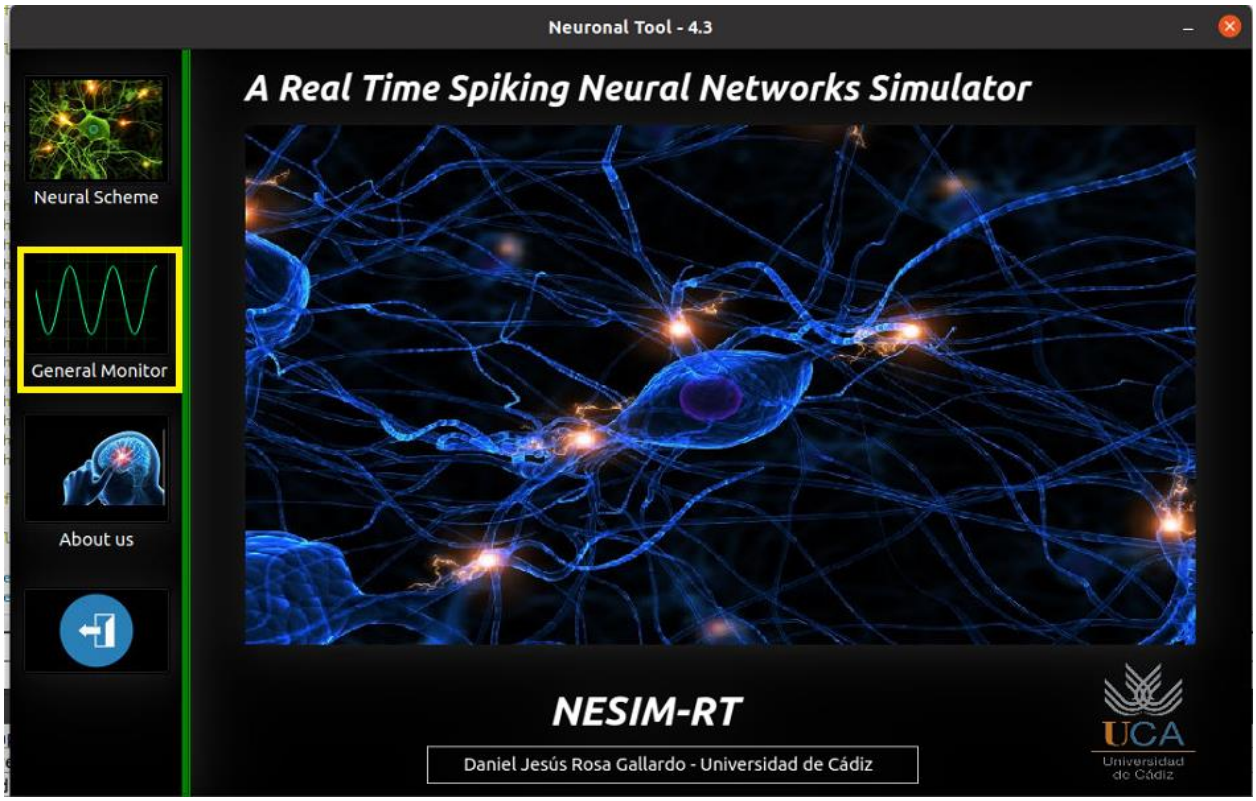
This guide will provide the user with the basic knowledge for the correct use of the NESIM-RT simulator.

Main screen



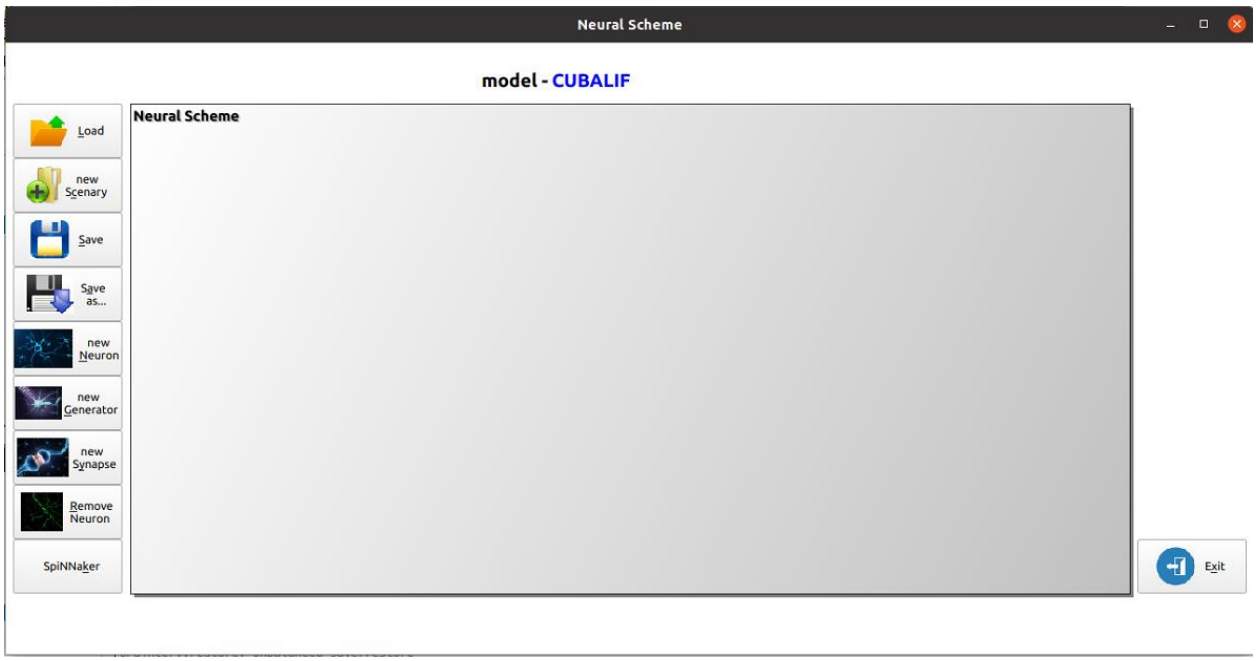


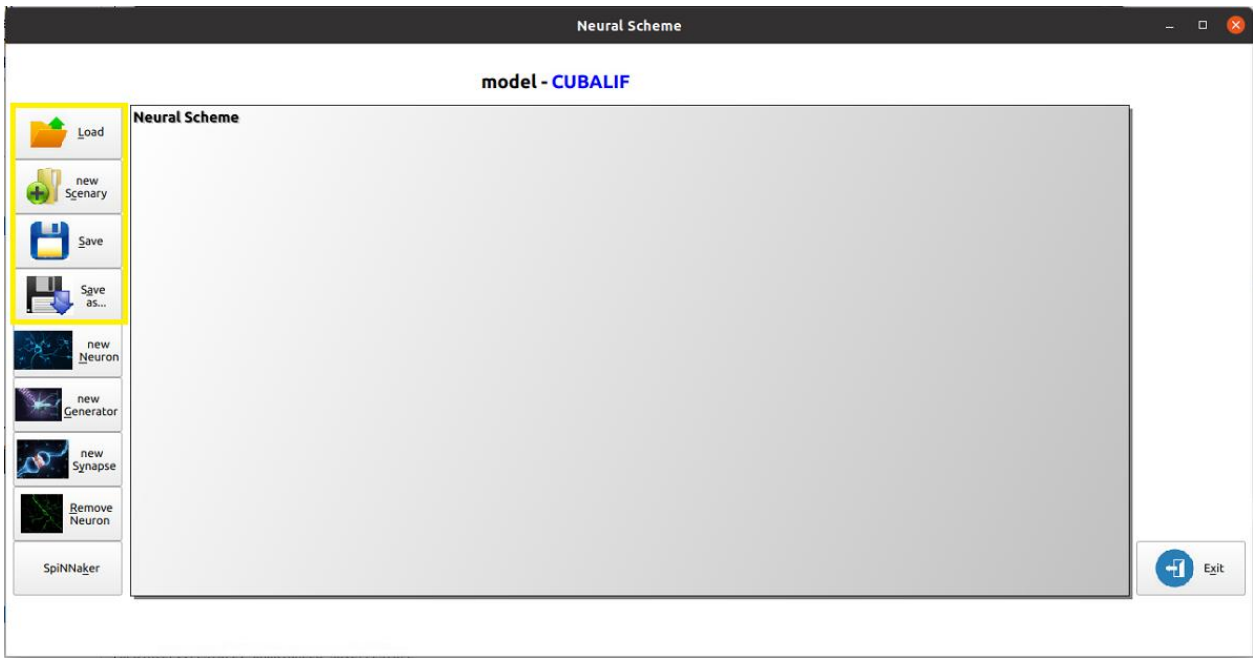
This button will take us to the Neural Scheme screen.



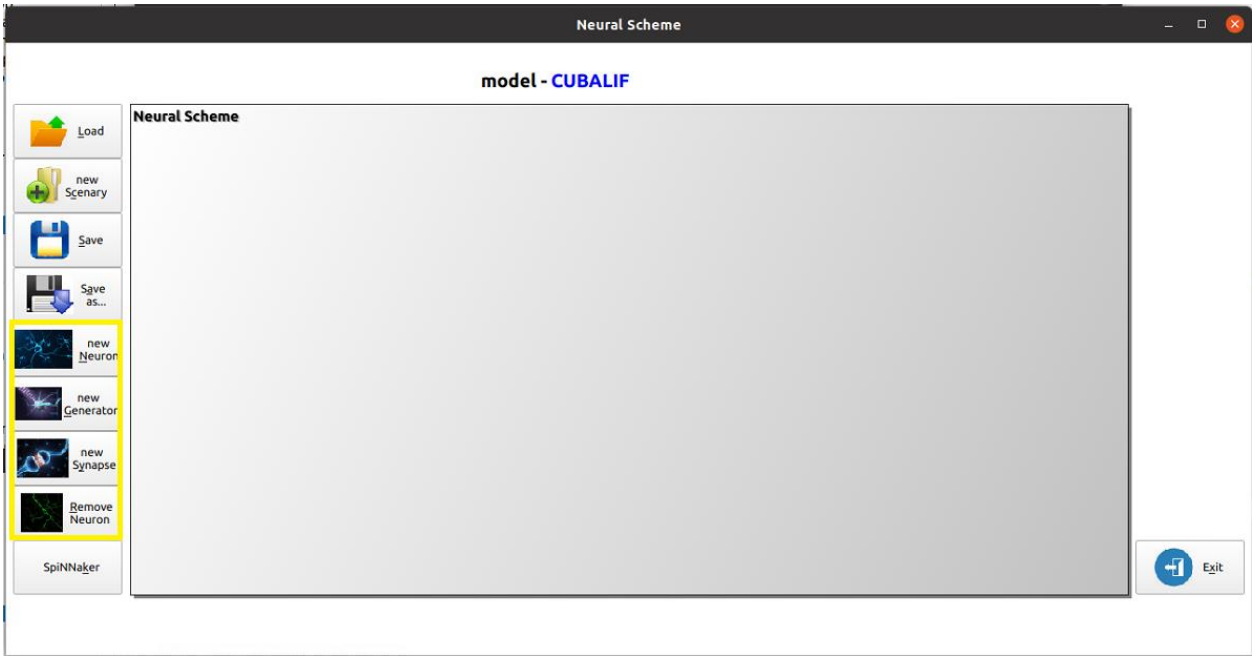
This button will take us to the general monitor screen. In it you can see all the current active signals.

Neural Scheme Screen

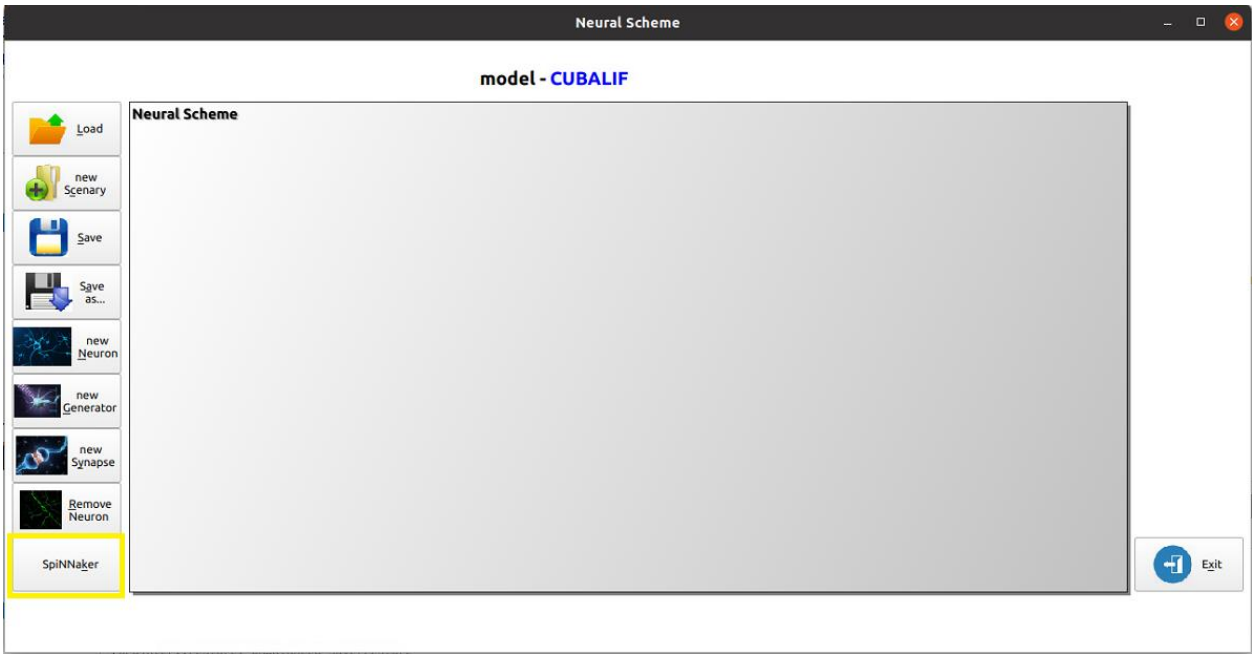




On this screen you can load an example or save your work.



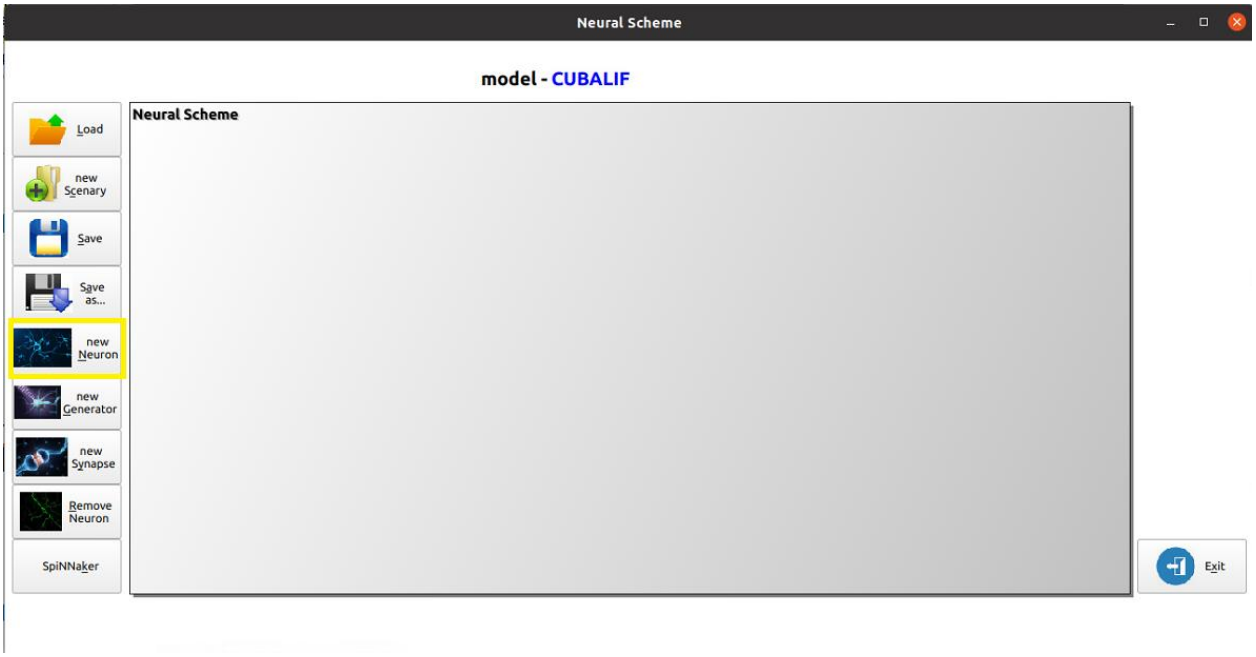
In addition, it will be possible to create, modify, move and delete the elements that make up our neural schemes as well as their elements (neurons, synapses and generators).



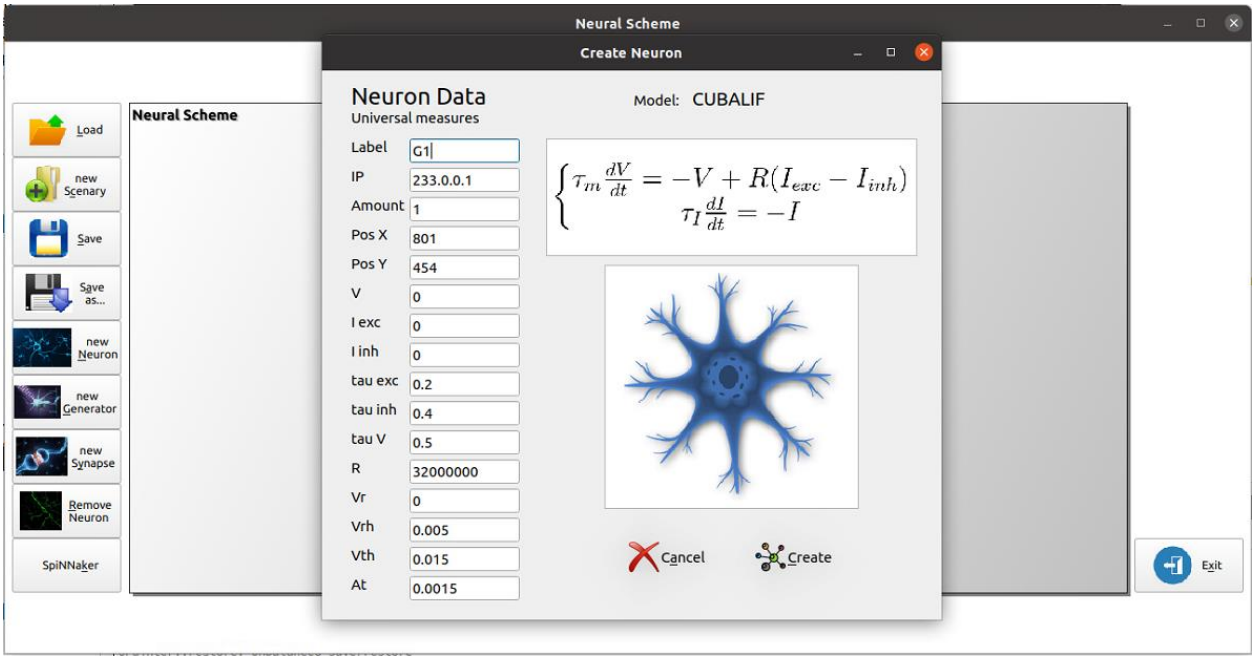
Finally we have the SpiNNaker button that will send us to the automatic generation screen of the script.

Create a new neural schema

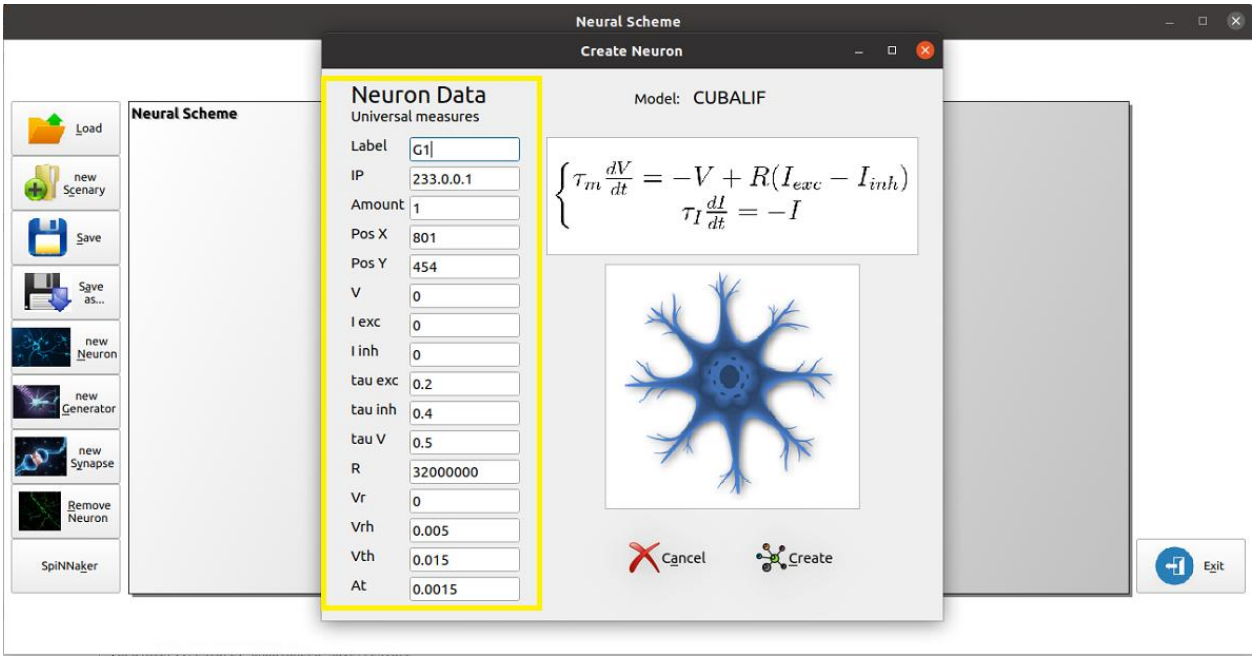
To create a neural schematic we first need to create a neuron:



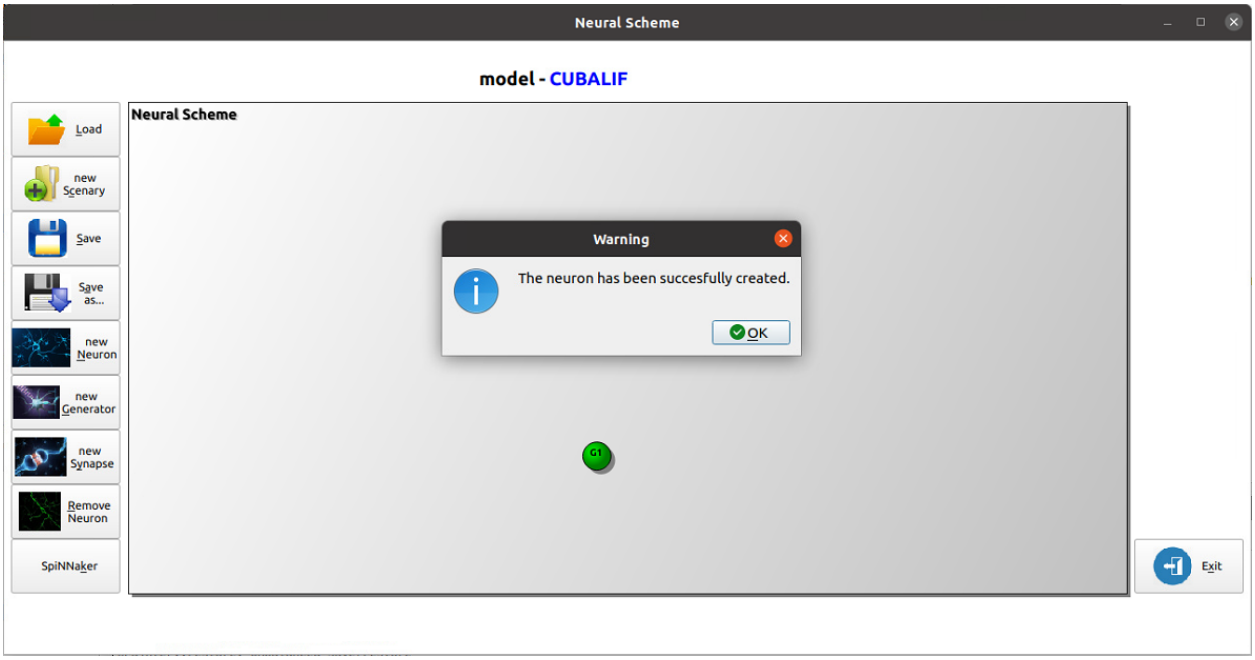
In this screen, modify the values that our neuron will have.



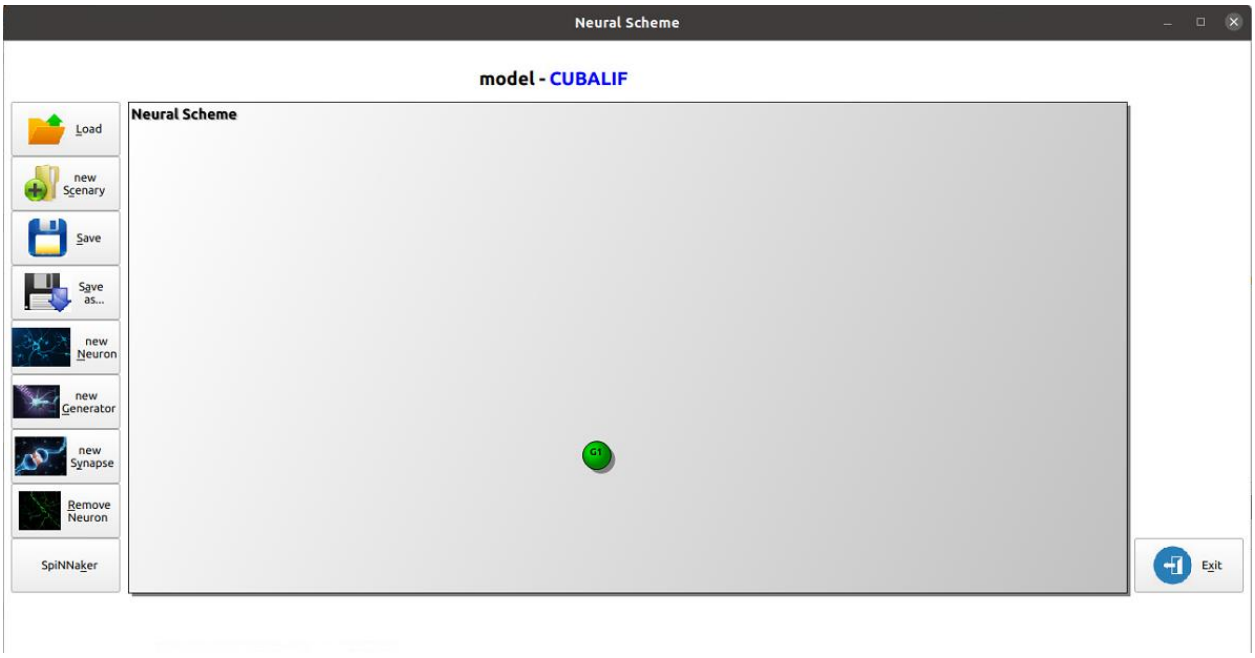
These are the initial default values.

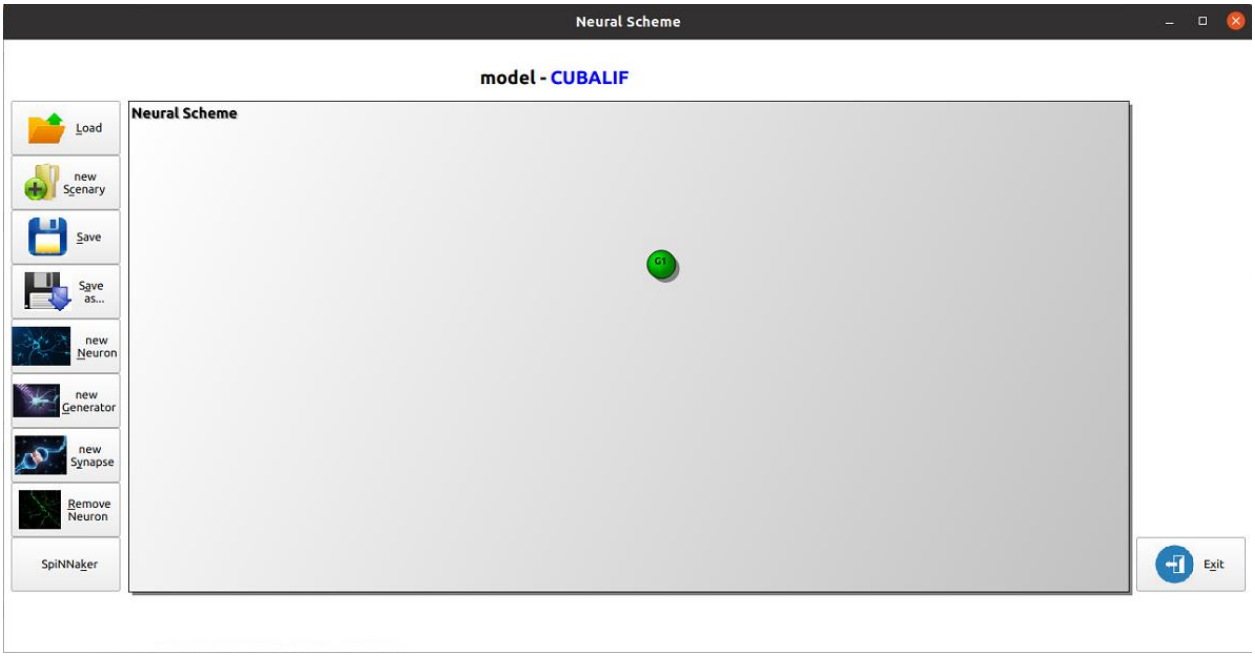


Click accept and a new neuron will be created.

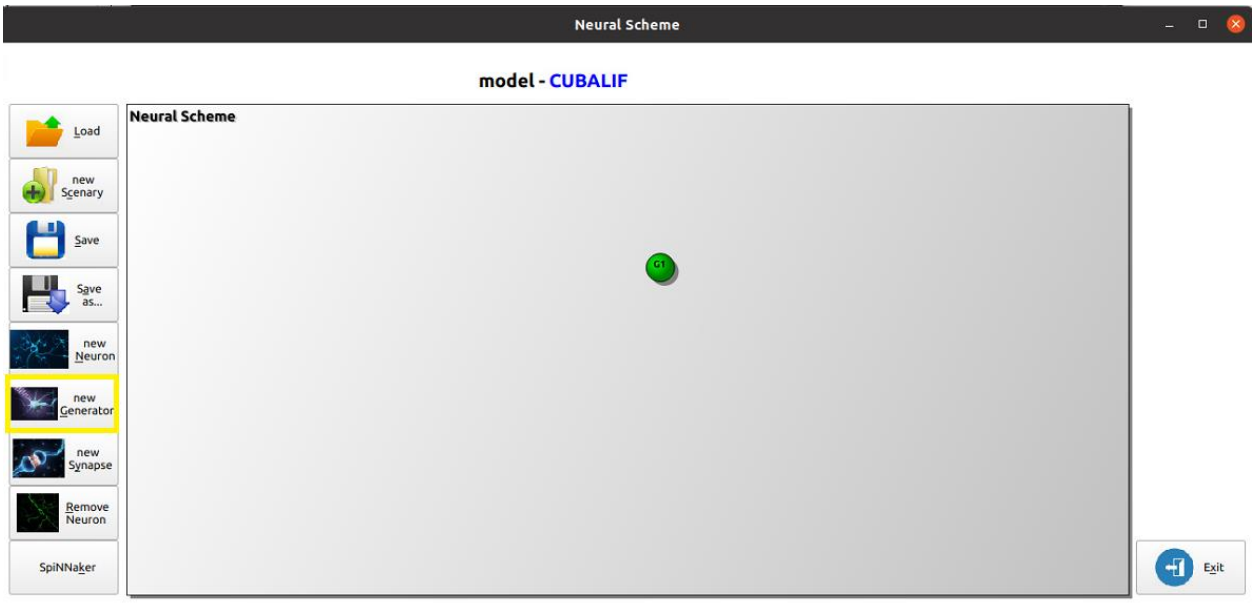


We can change the position of the elements created within the tapestry, by dragging the element.

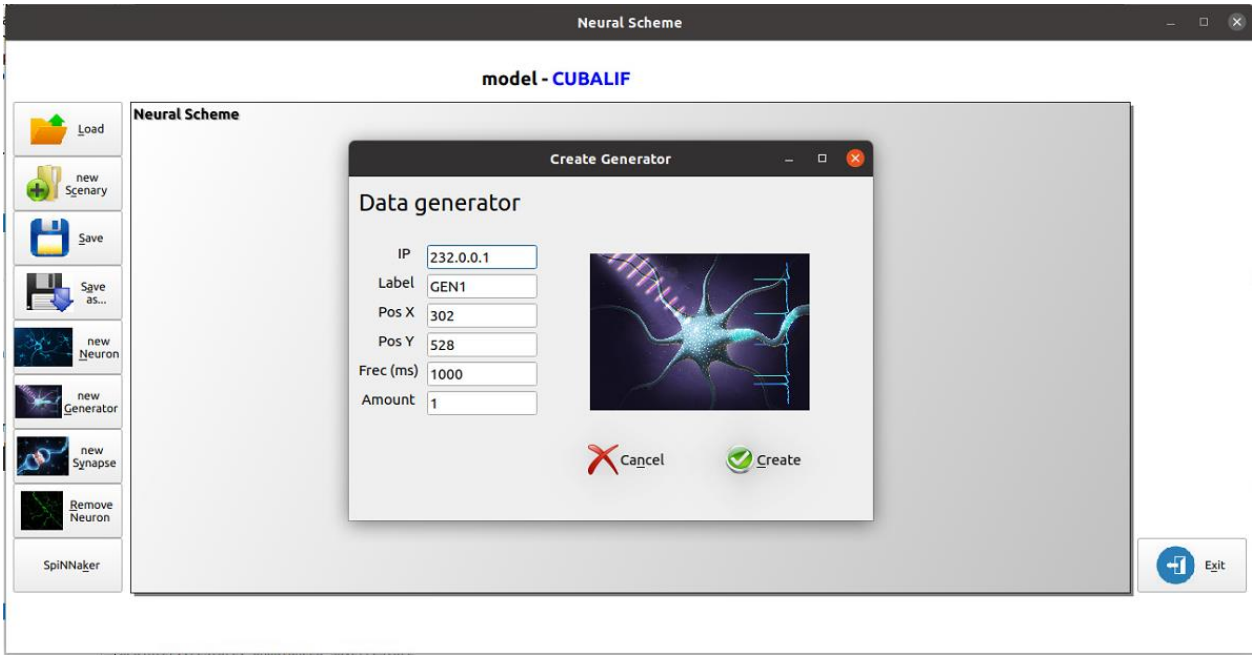




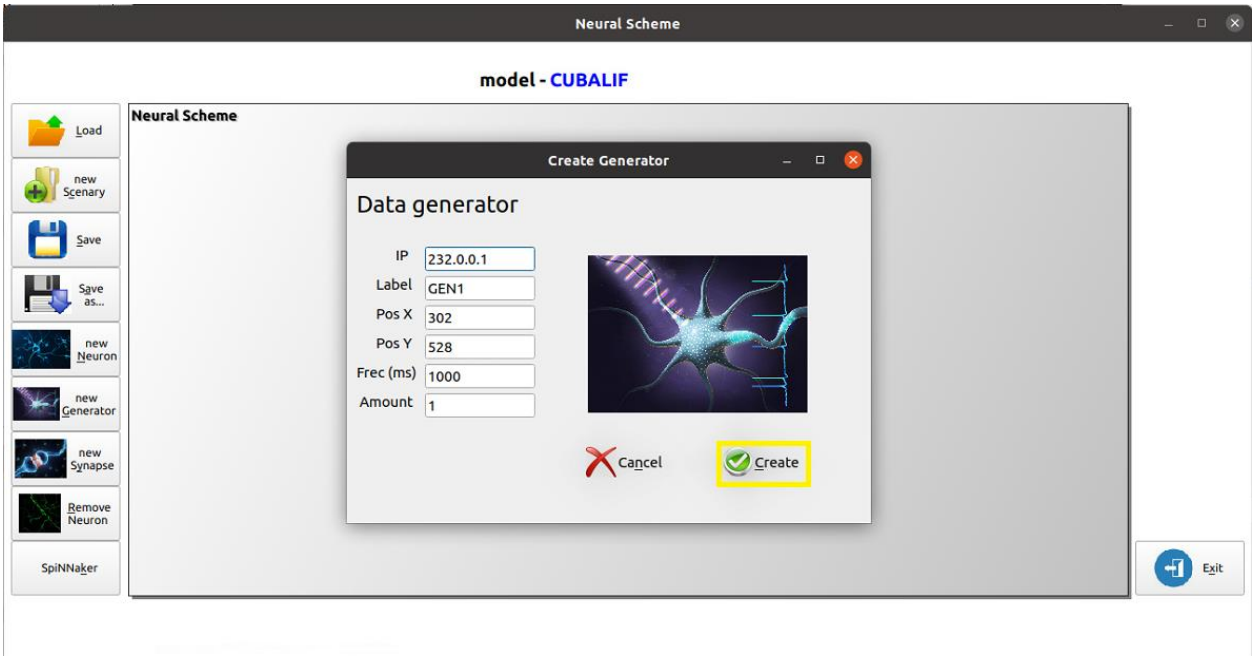
Now we need to create a generator:



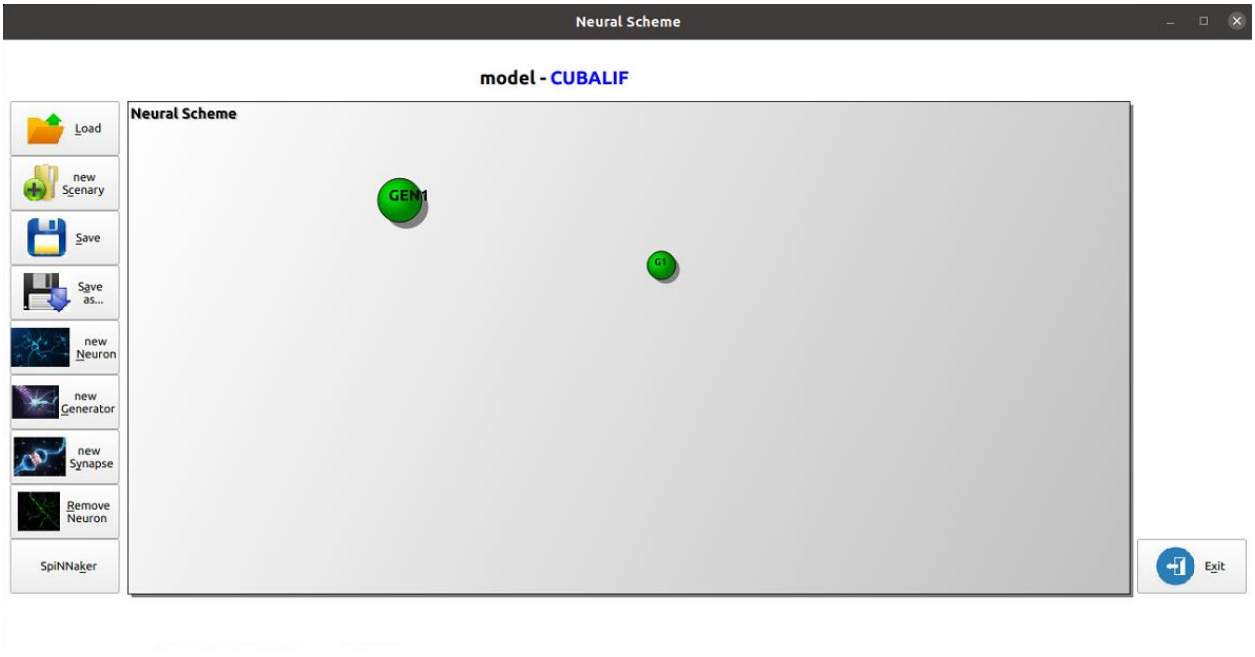
Again in the pop-up window you can modify the parameters of this generator.



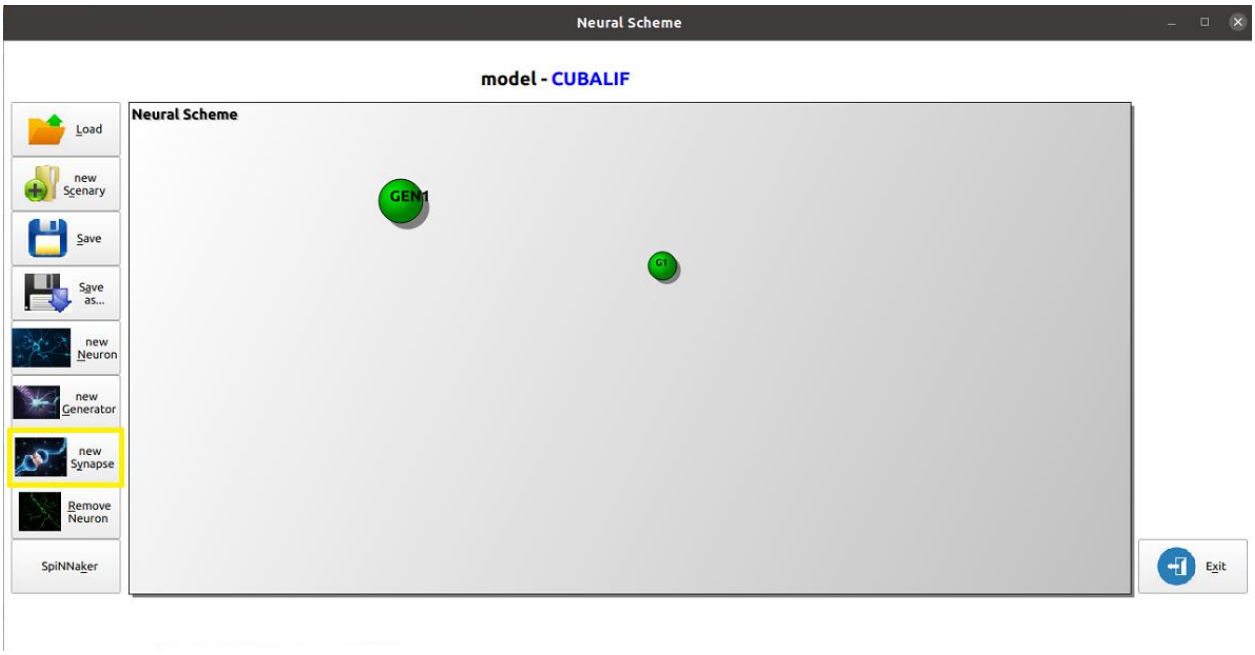
We create the generator.



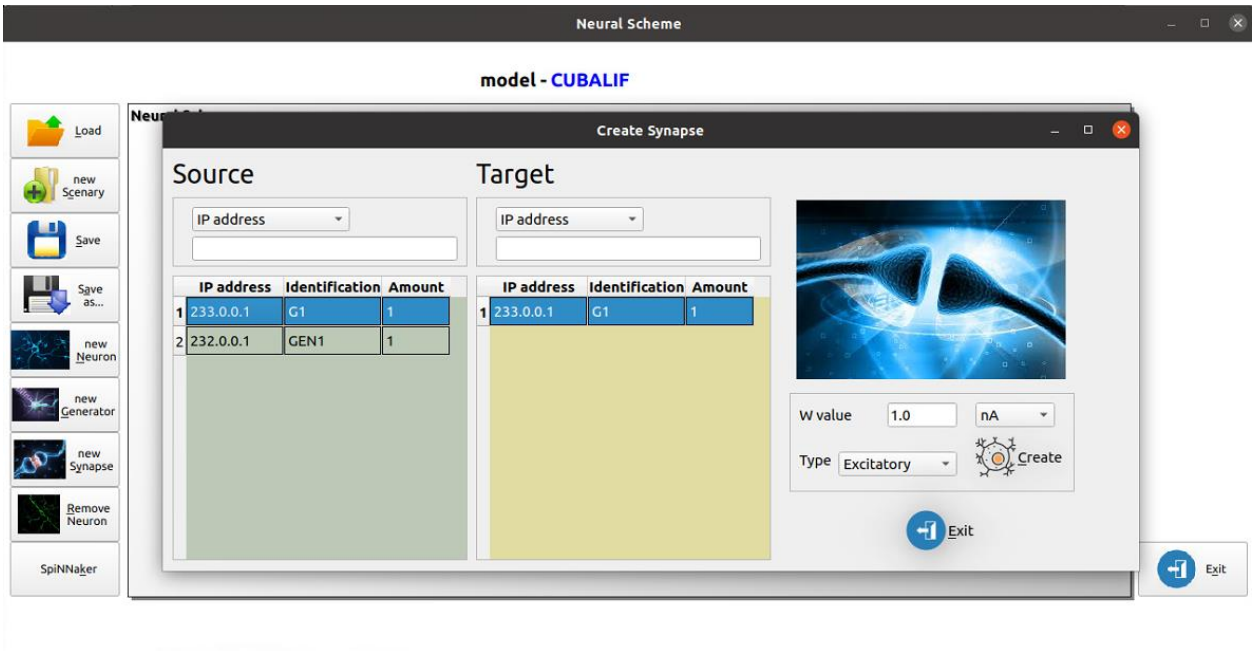
And it is observed that the new element is already in the tapestry.



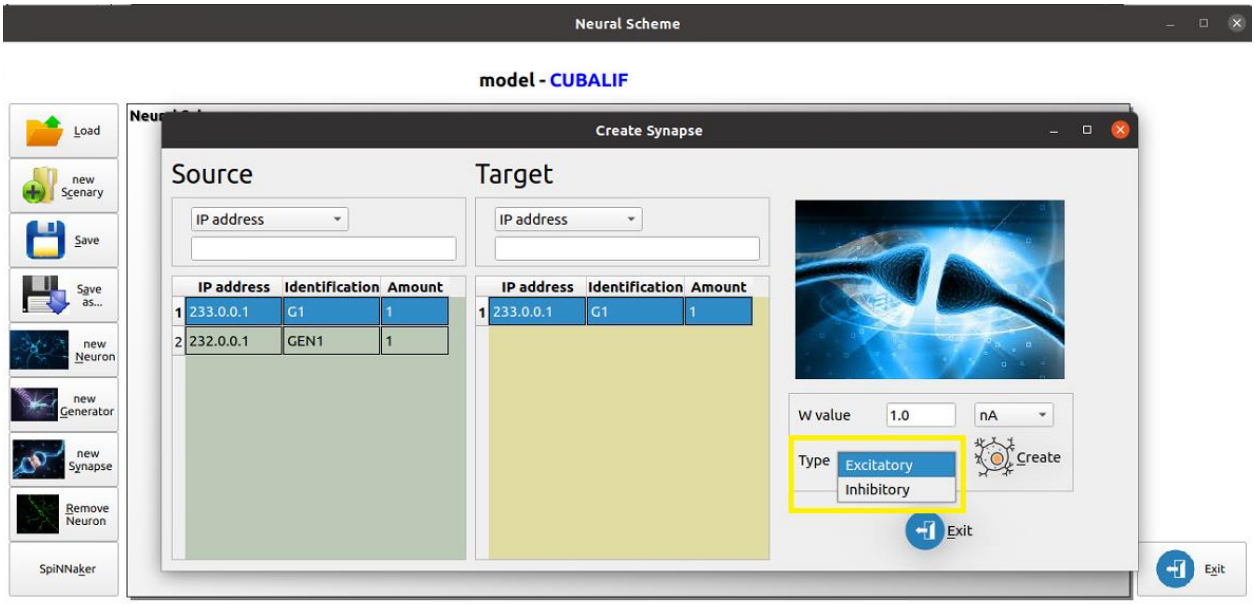
Now we must unite these two elements. To do this we must create a synapse.



In this section we must be careful since the synapse must go from the generator to the neuron. To do this, select the generator to be joined in the first box (Source) and the neuron to which you want to join this synapse in the second box (Target).

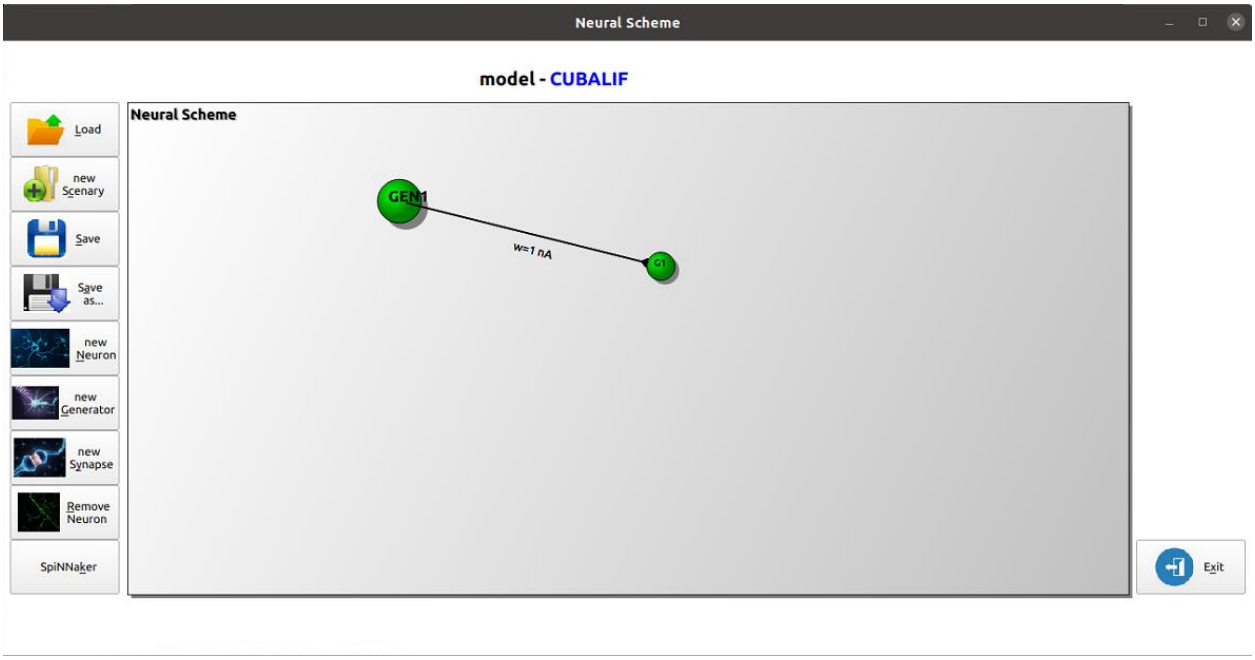


Consider whether you want to create an inhibitory or excitatory synapse.

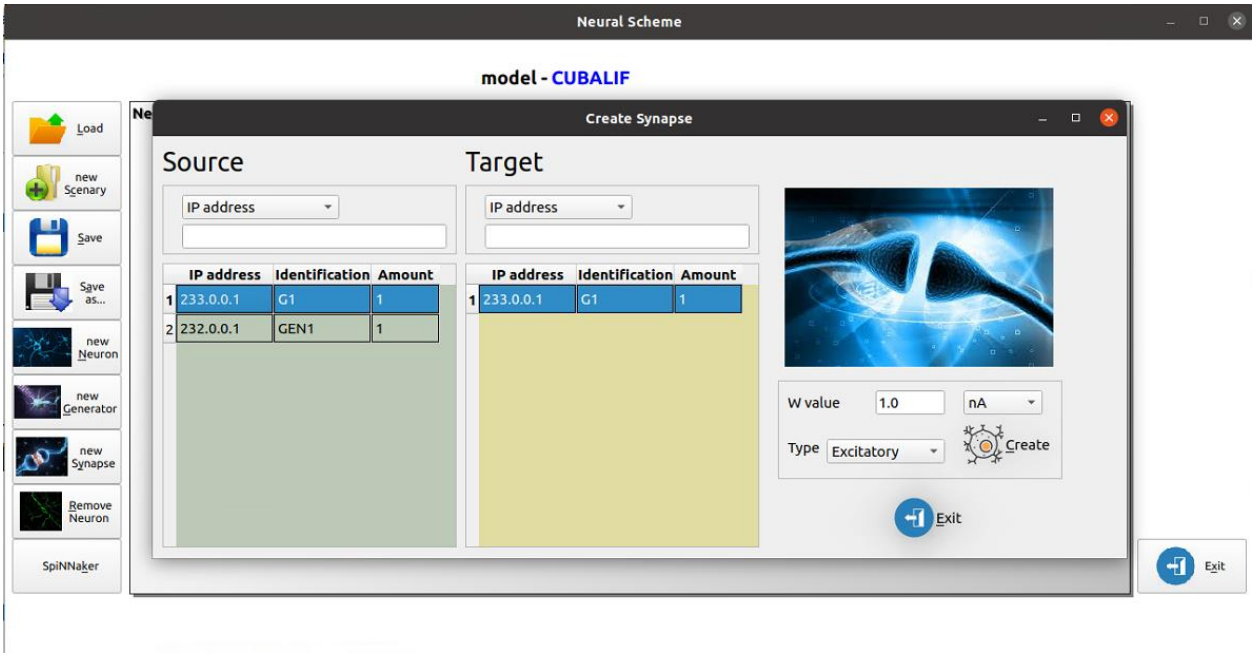


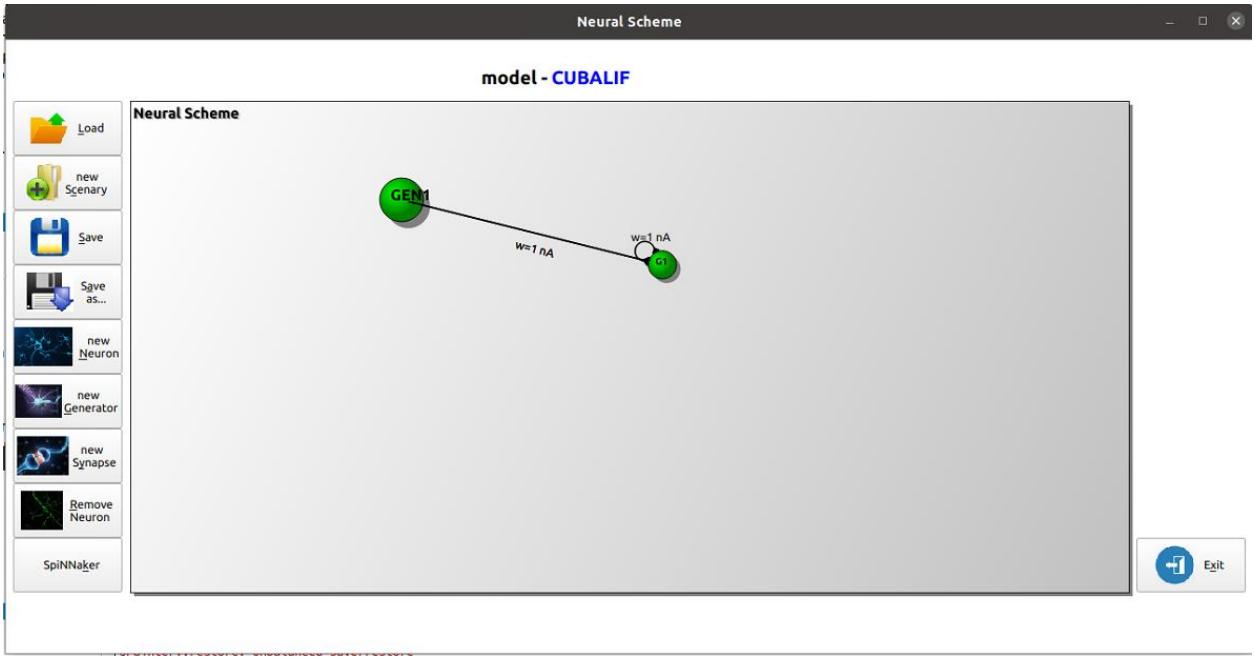
And we create the synapse.

And the synapse will be created.

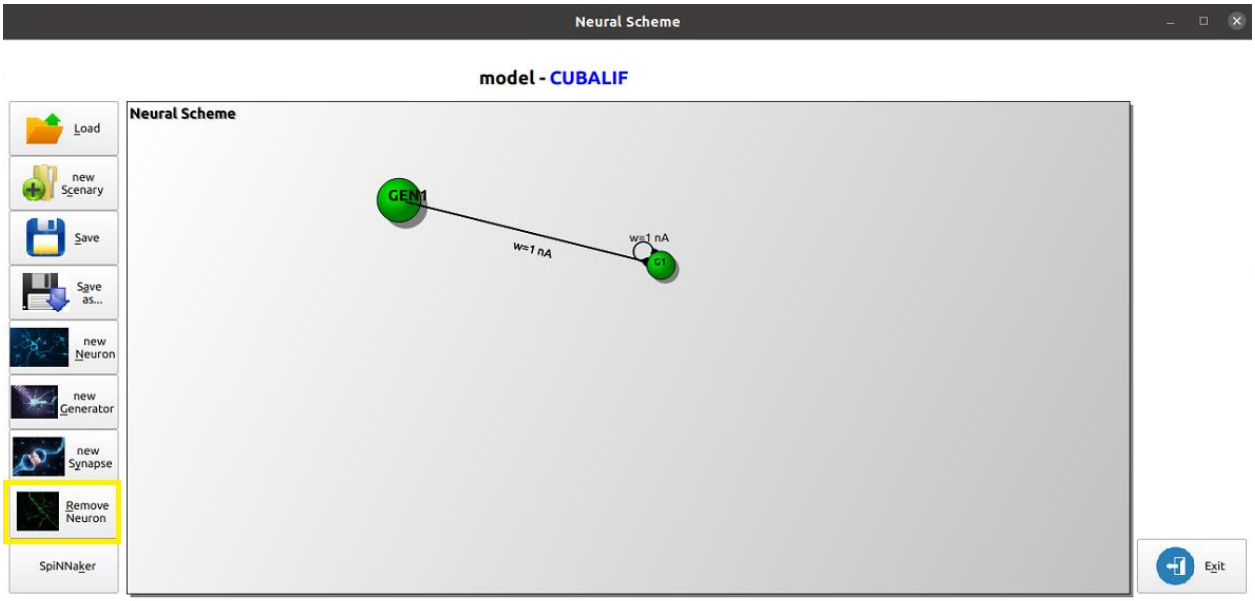


Synapses can also be created from a neuron to itself.

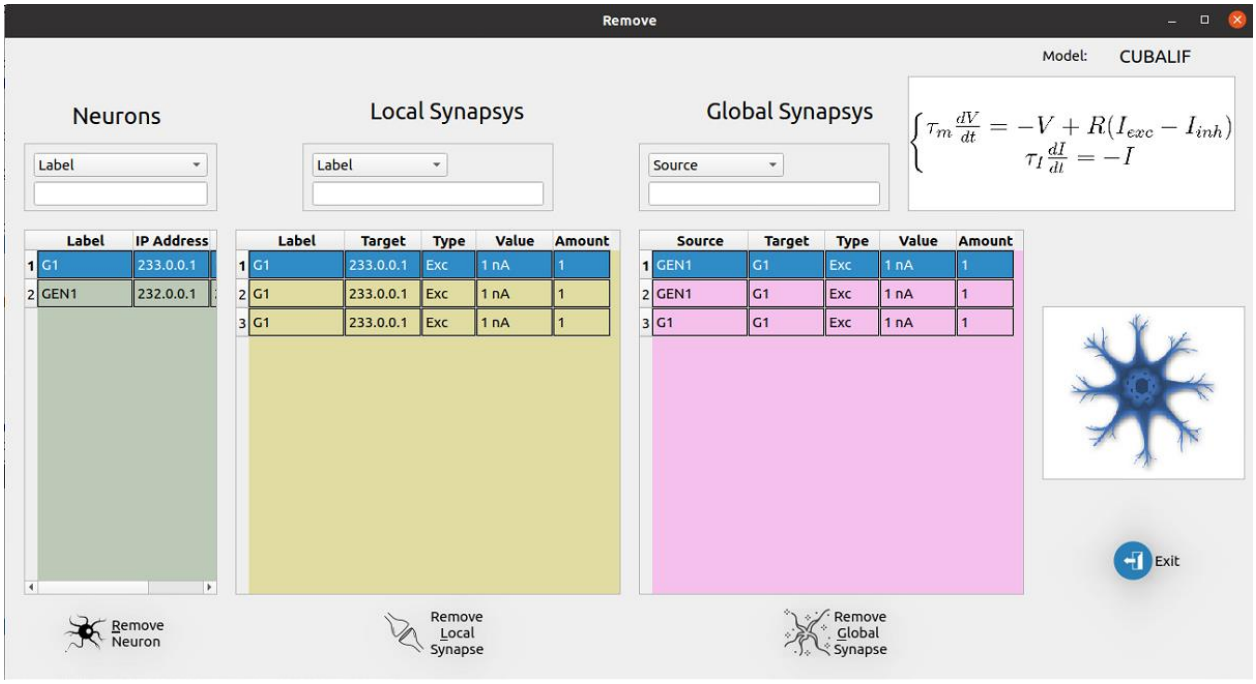




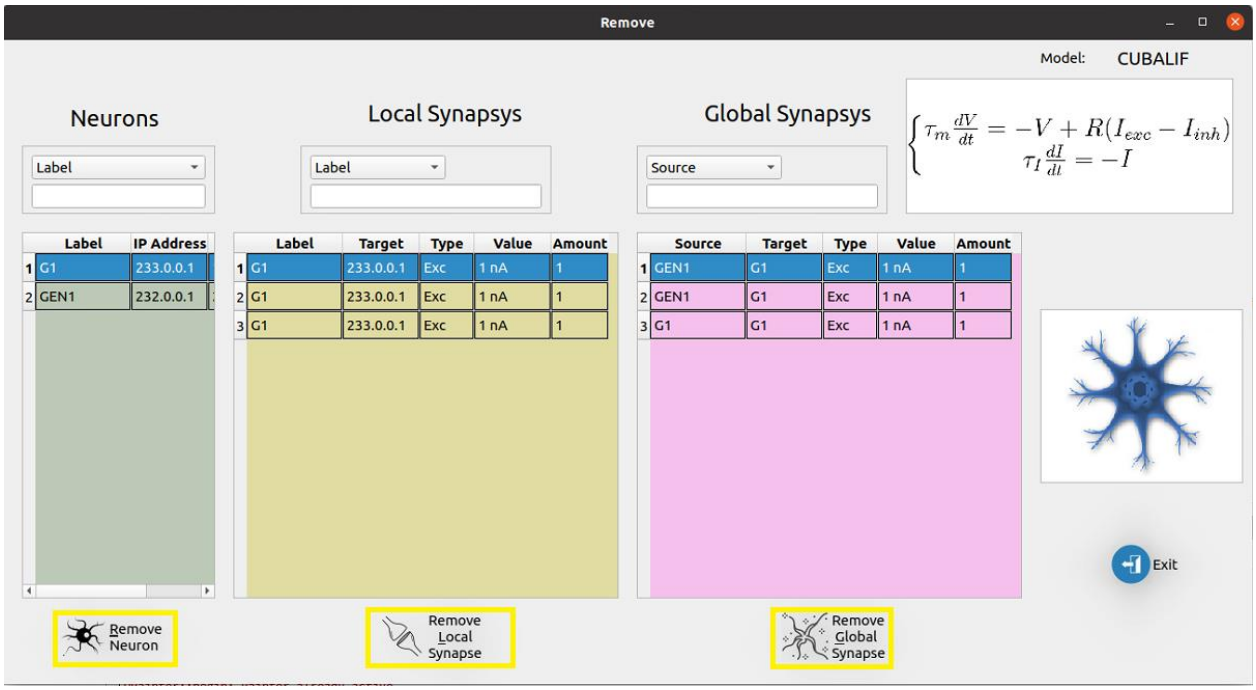
To remove a neuron, generator or synapse we must press the Remove Neuron button.



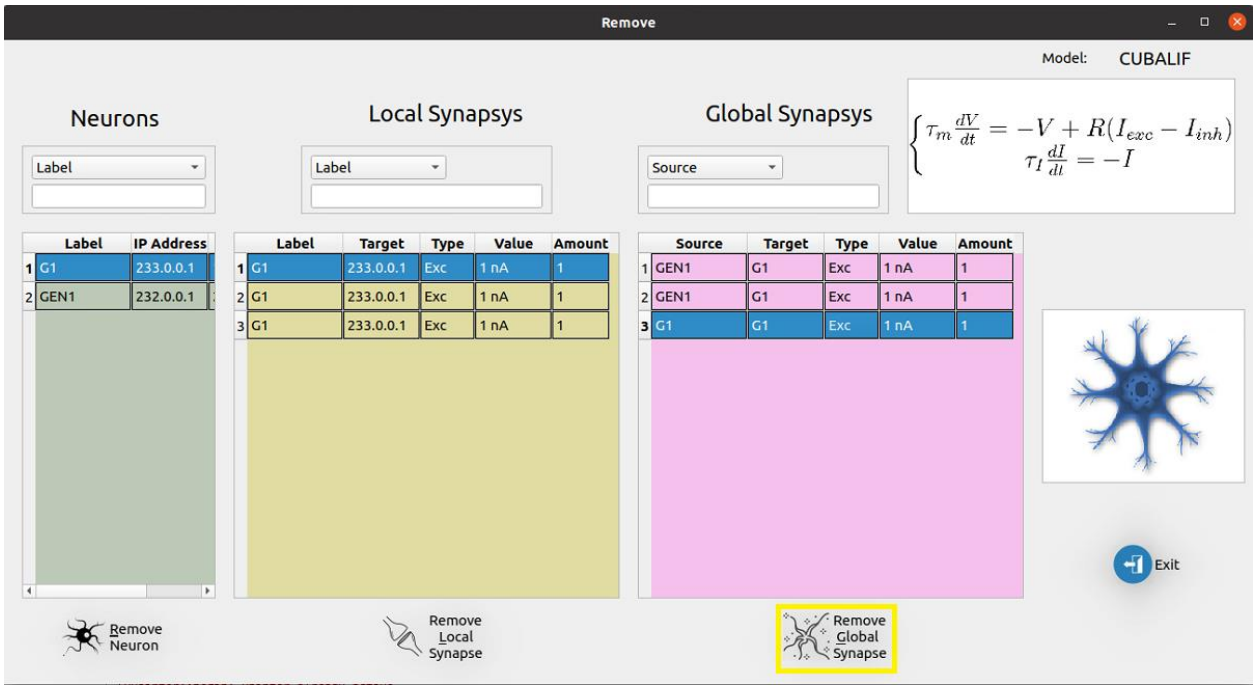
Select the item to delete.



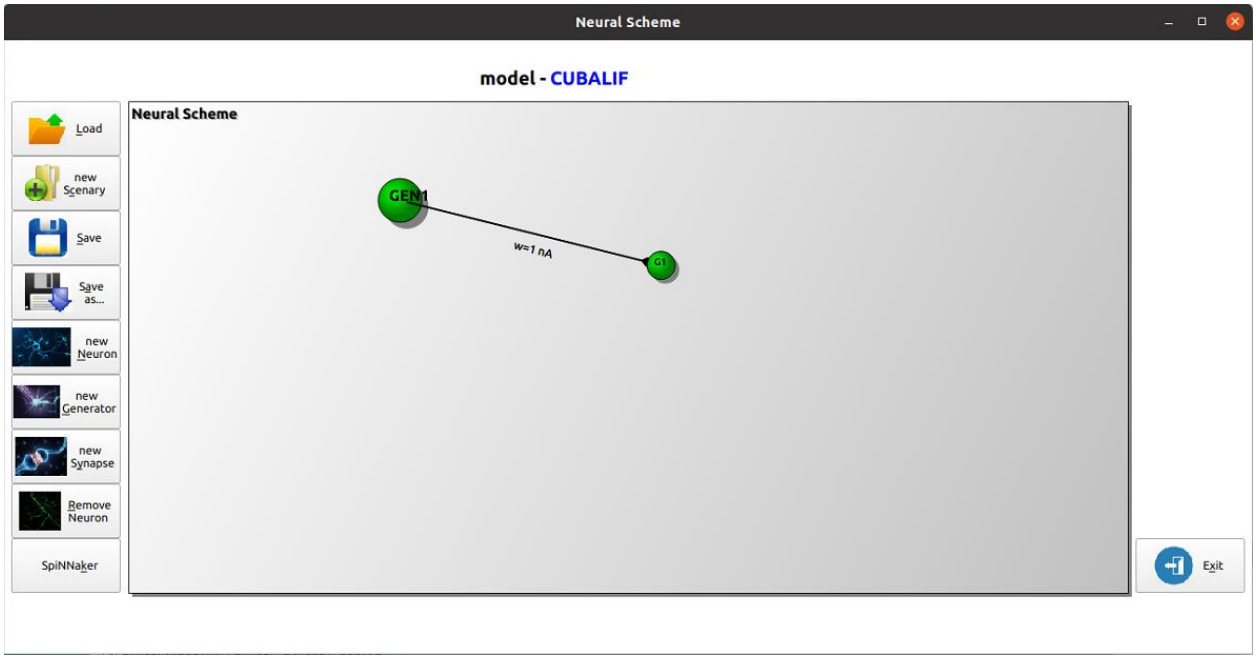
And you press one of the 3 lower buttons to remove the item.



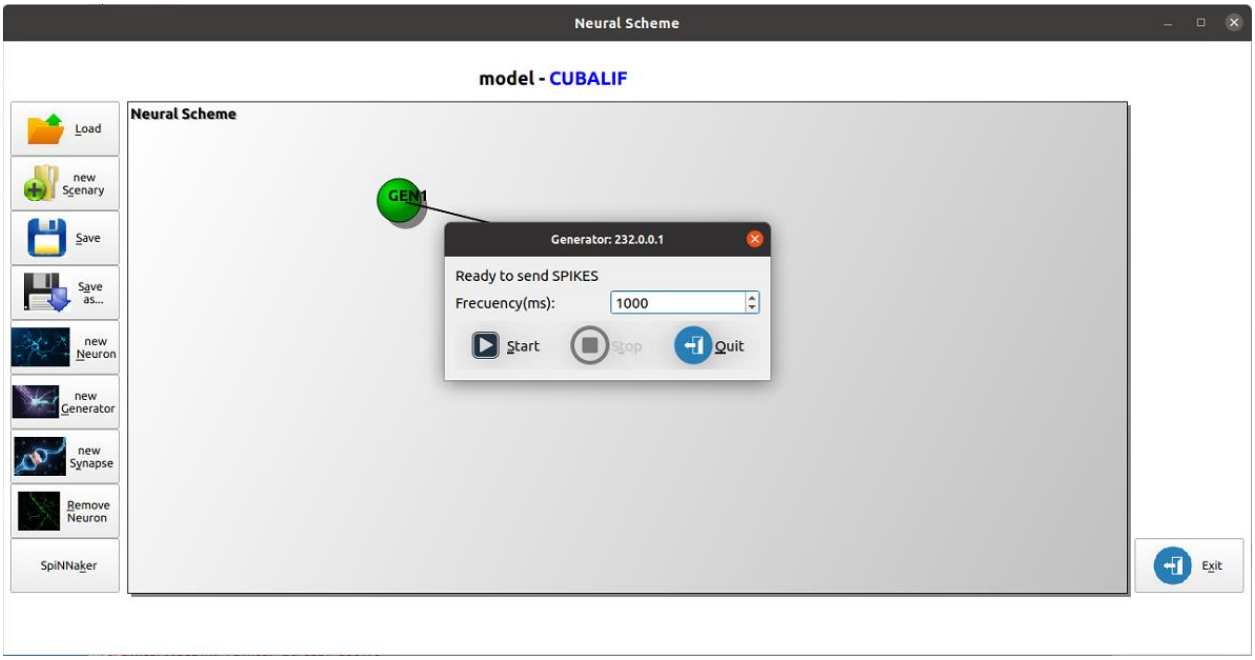
In this case the recurrent synapse will be eliminated.



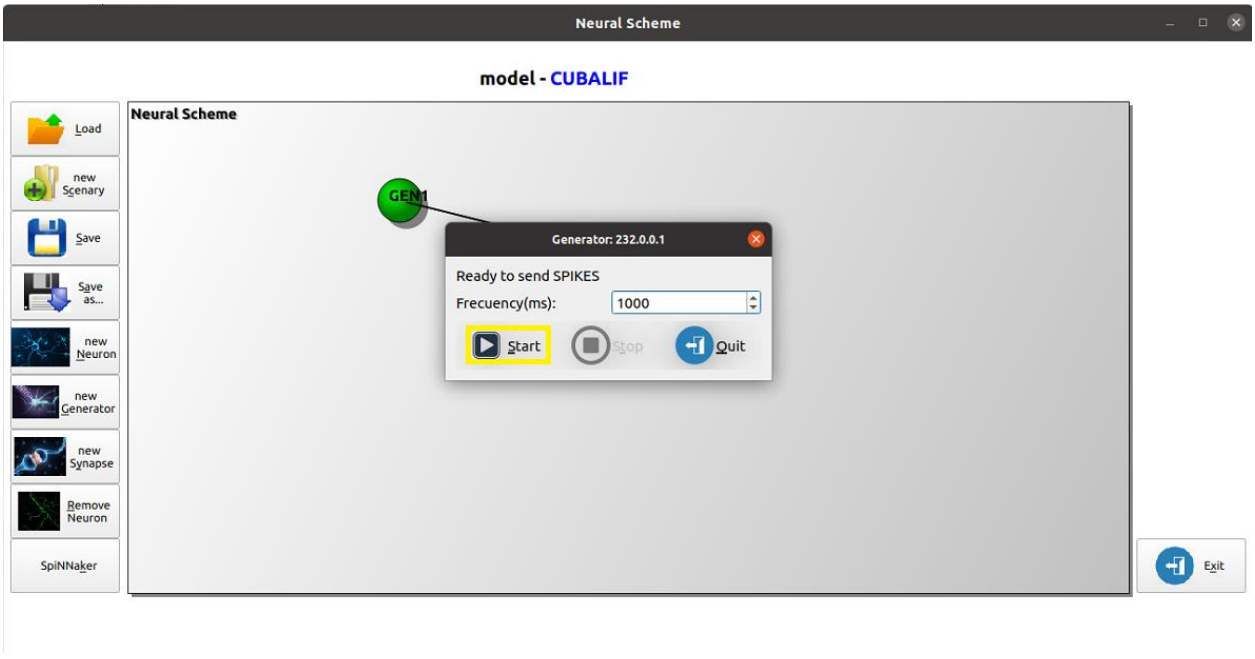
And ready.

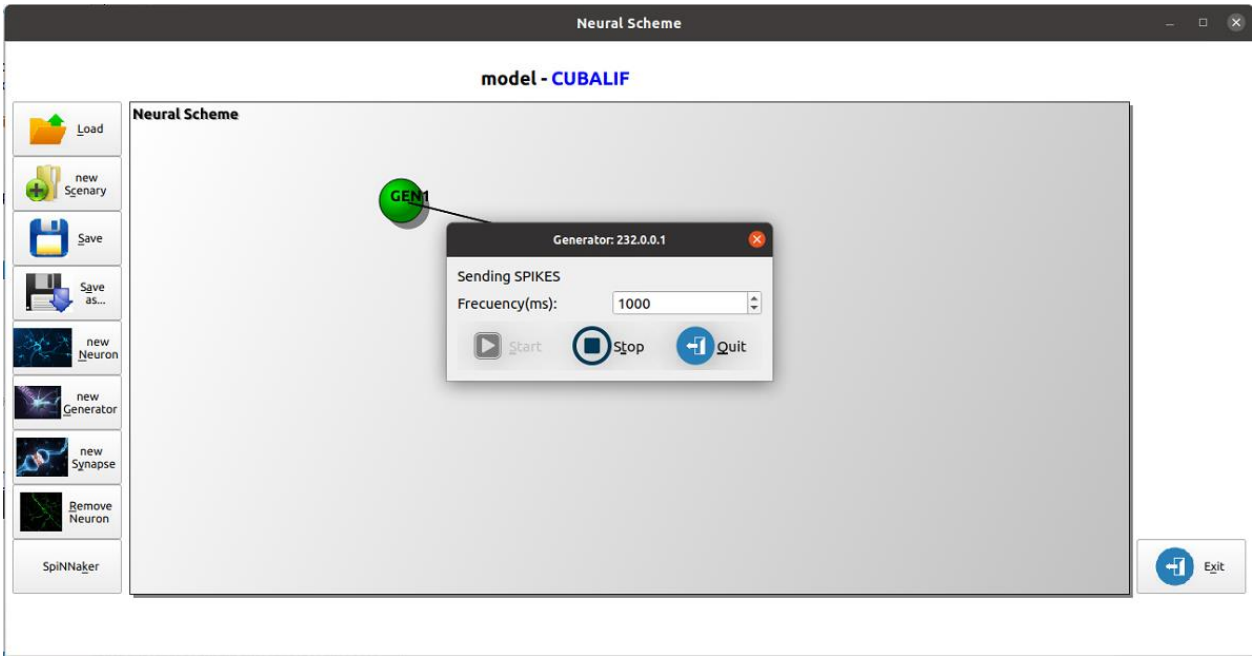


To run the simulation you must first start the generator. To do this, you must click twice on it and the following window will appear.

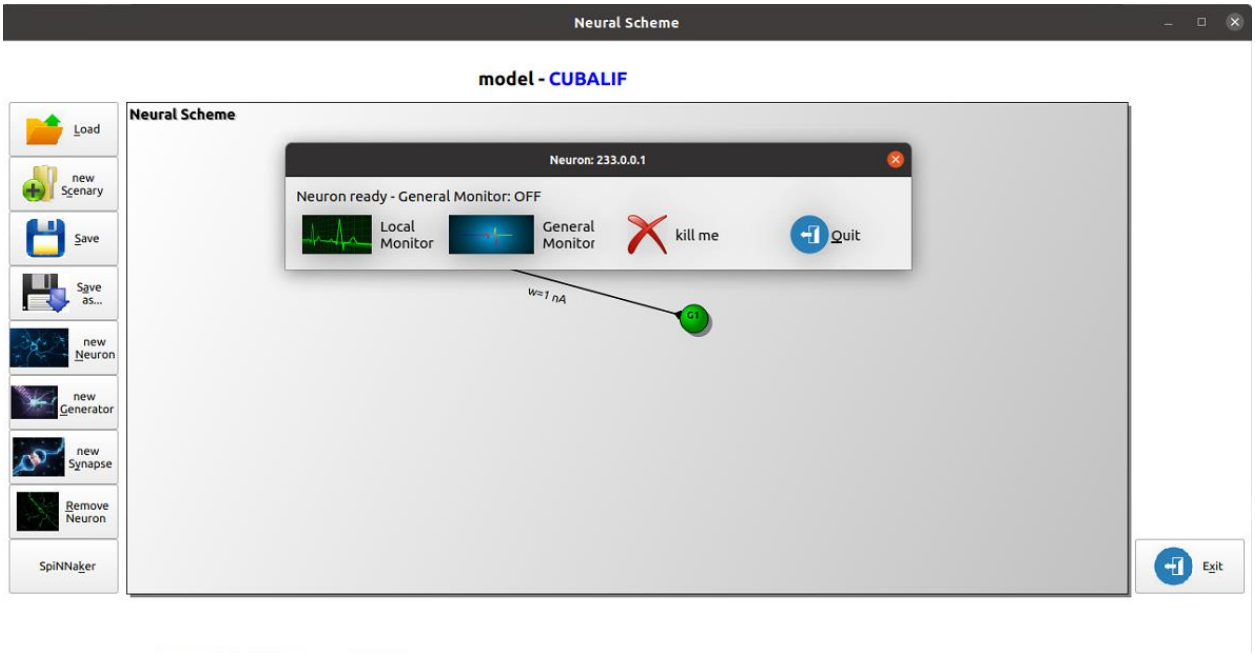


We press the start button.

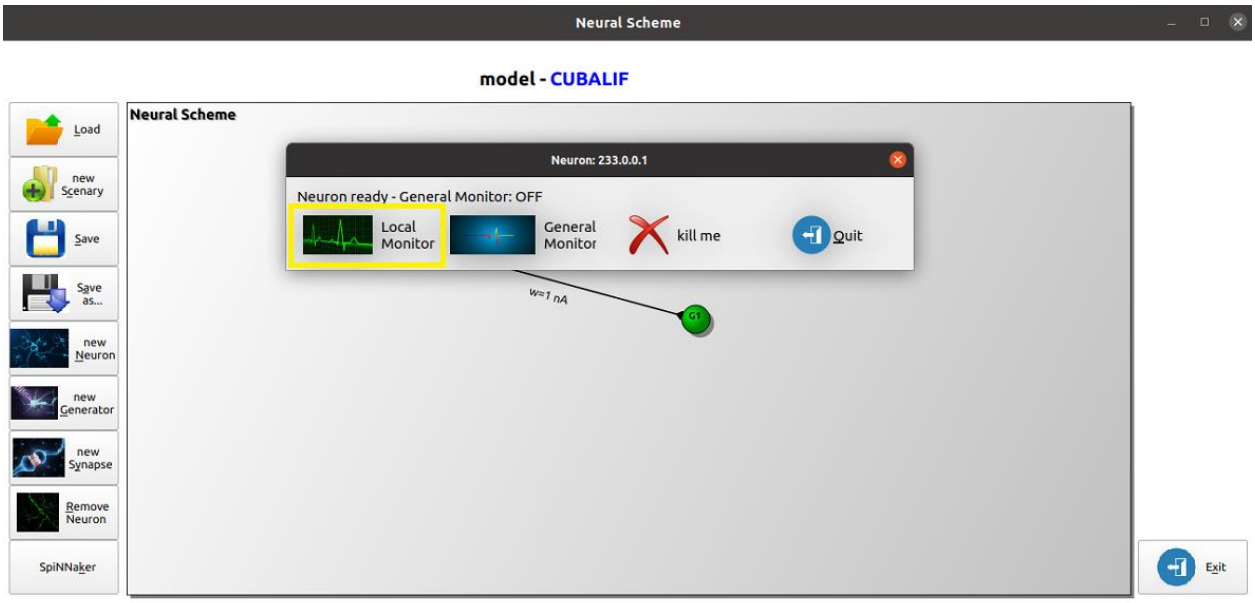


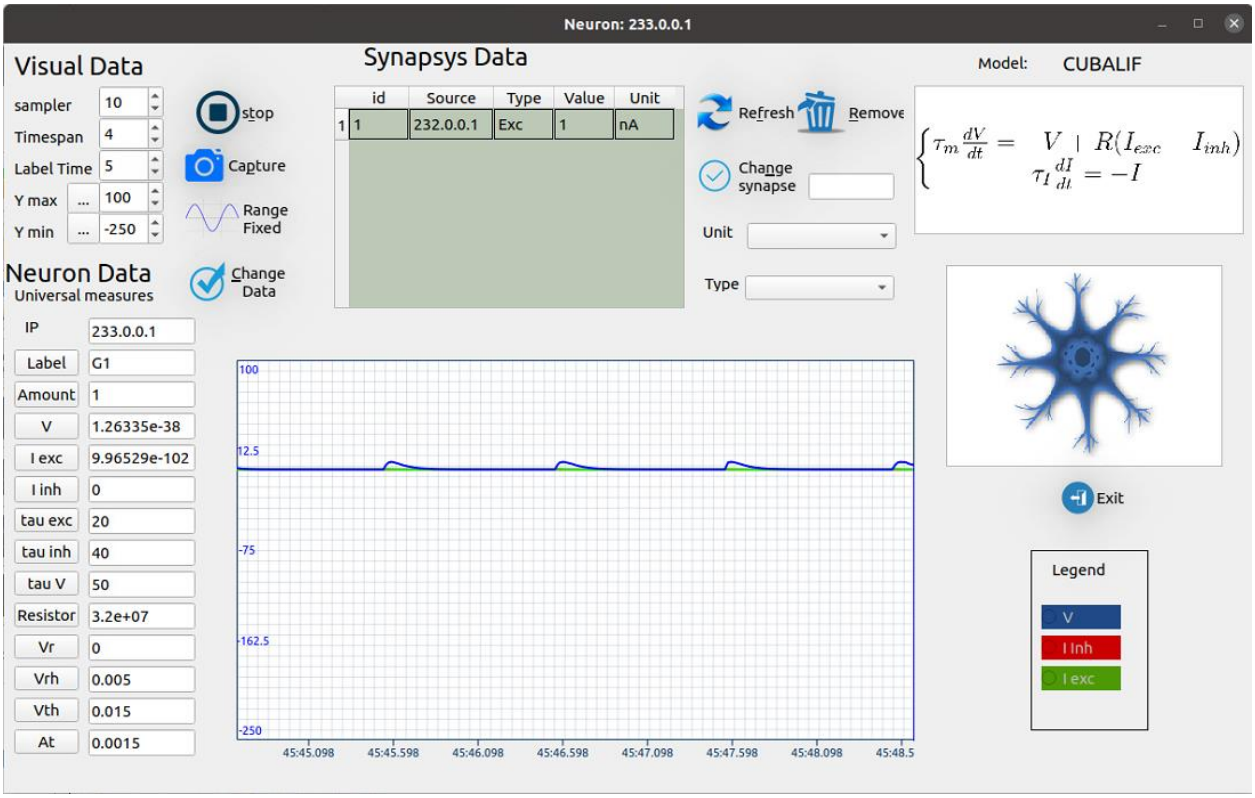


To see the simulation, you must press the neuron twice and the following box will open.

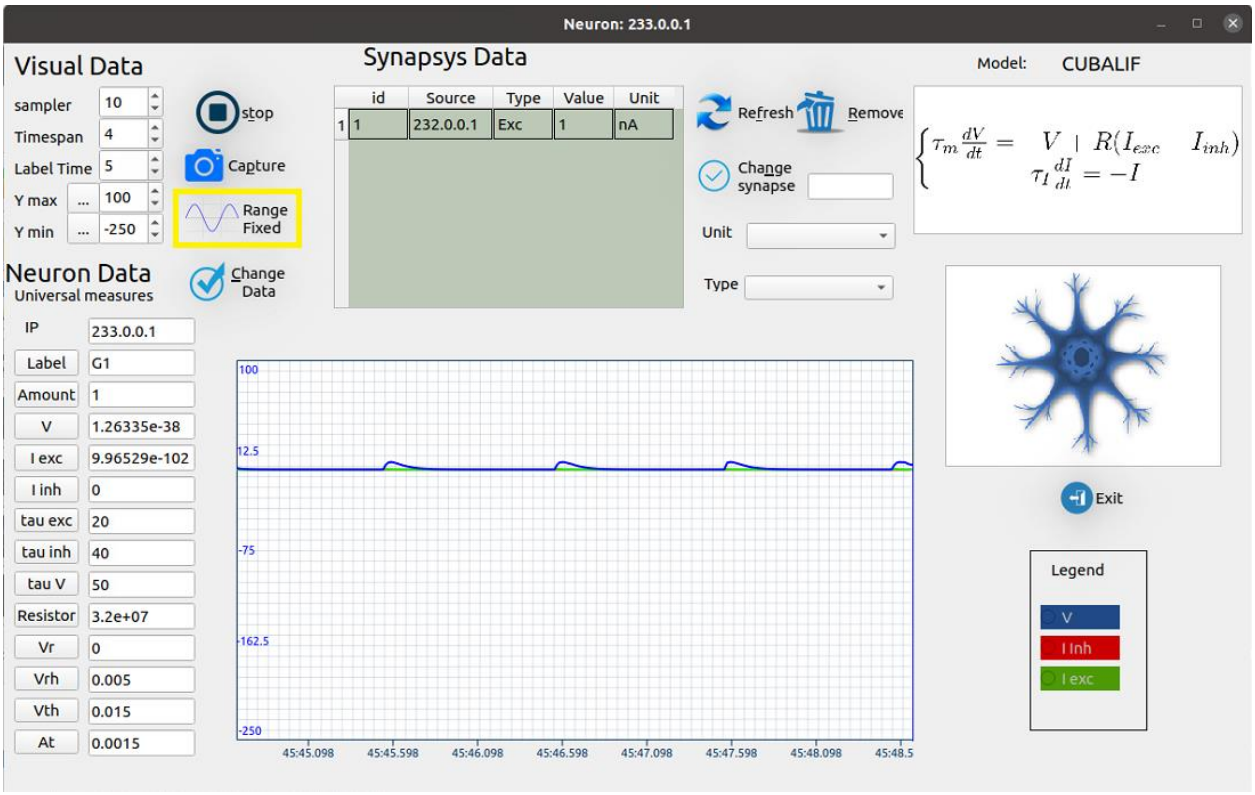


And the local monitor button will be pressed (the general monitor button will be explained later).

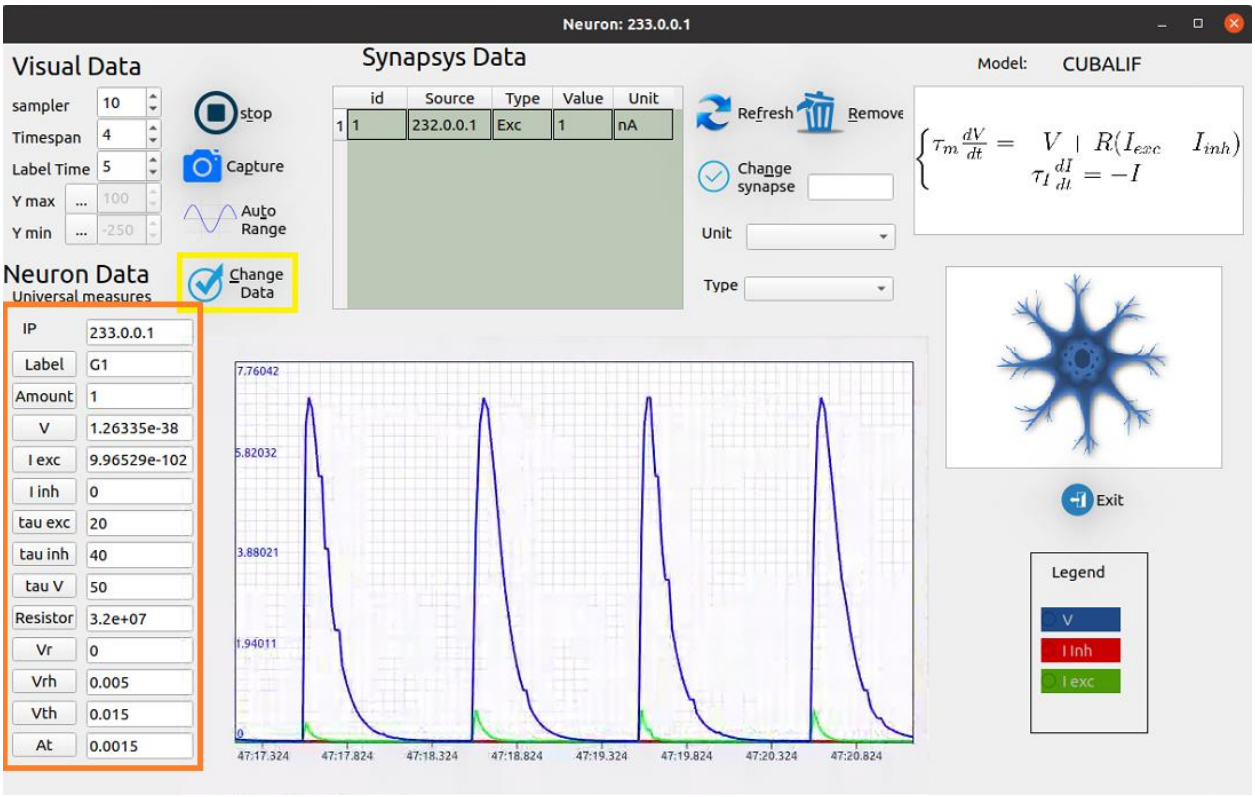




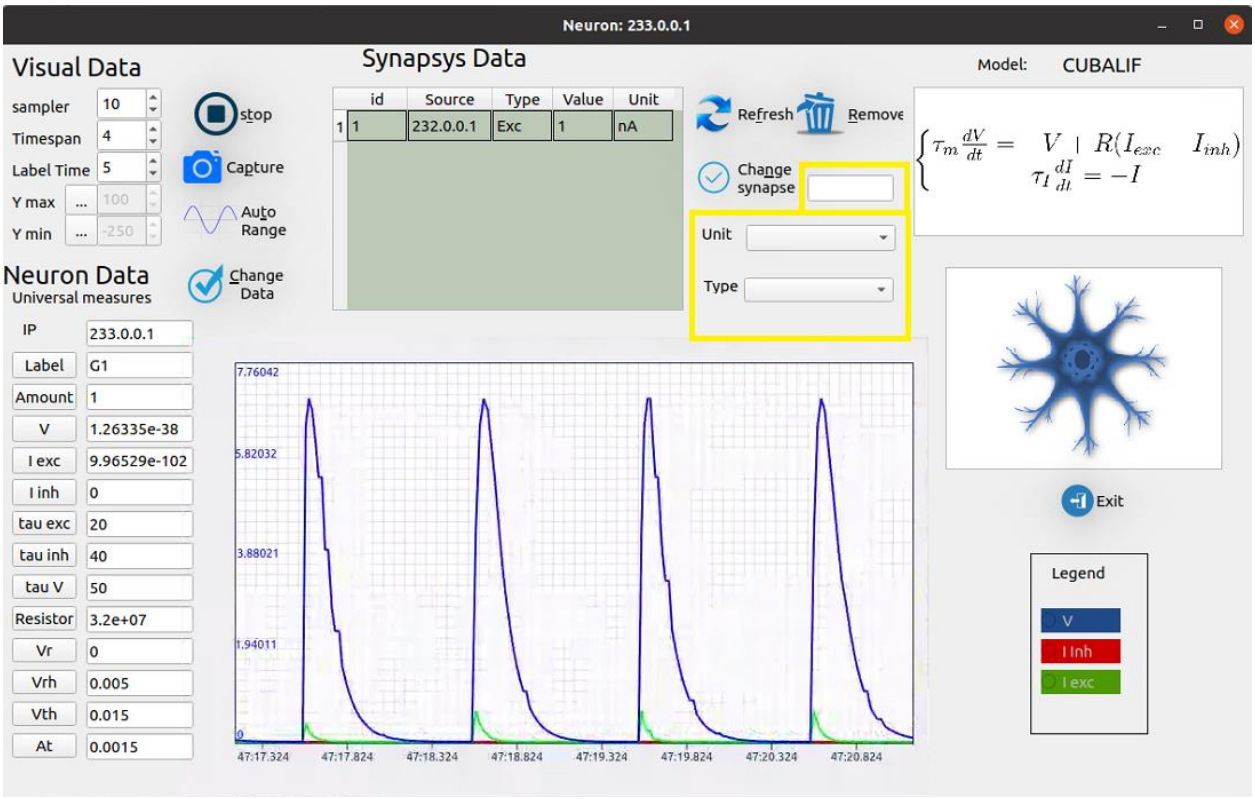
To adjust the graph automatically, press the Fixed Range button



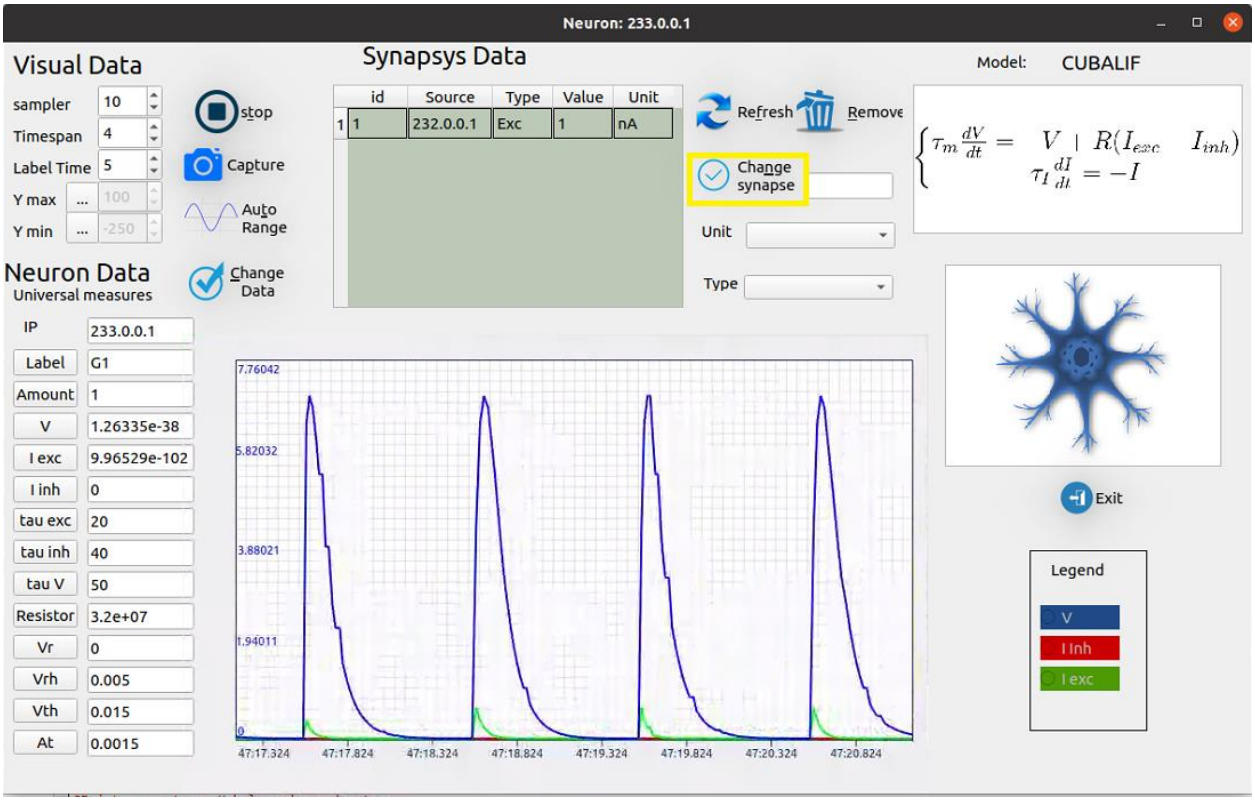
If any value is changed on the left of the window, which is the part in charge of changing the values of the neuron, the Change data button must be pressed to update these values.



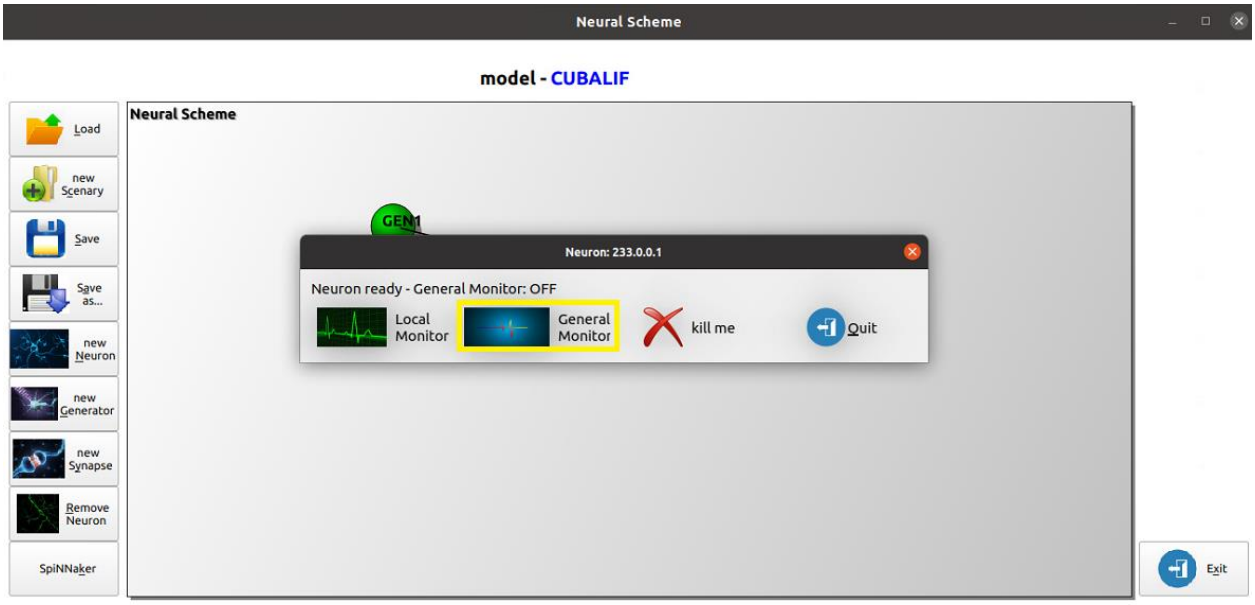
If you want to change any value related to the synapse.



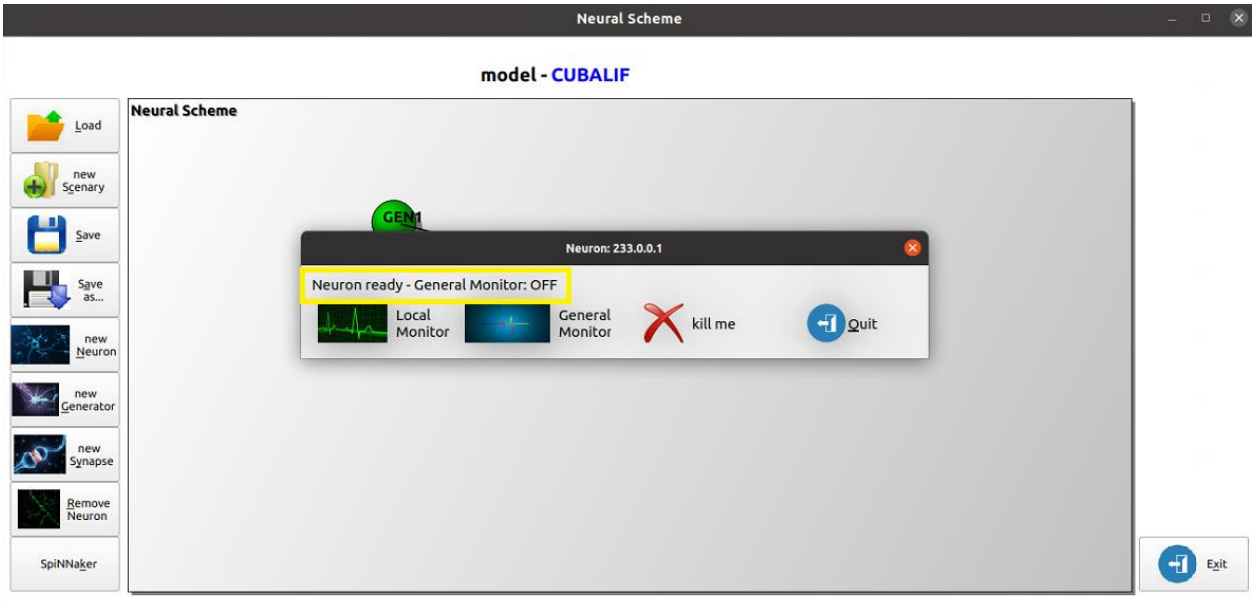
The “Change synapse” button must be pressed.



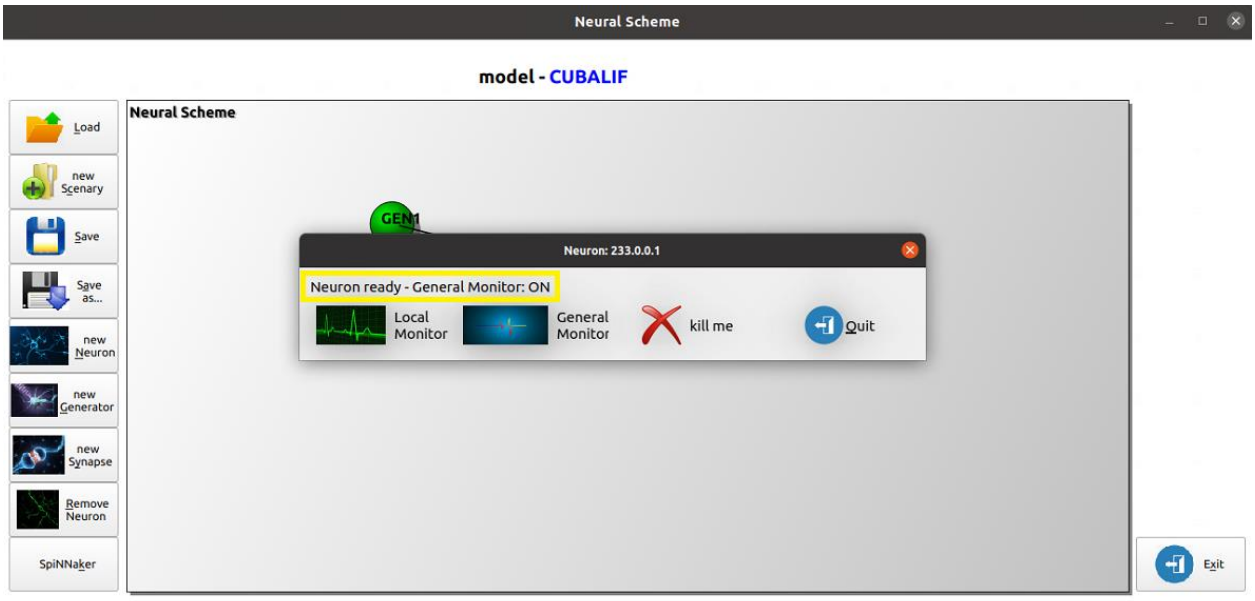
Now it's time to talk about the “General Monitor” button from the previous screen.



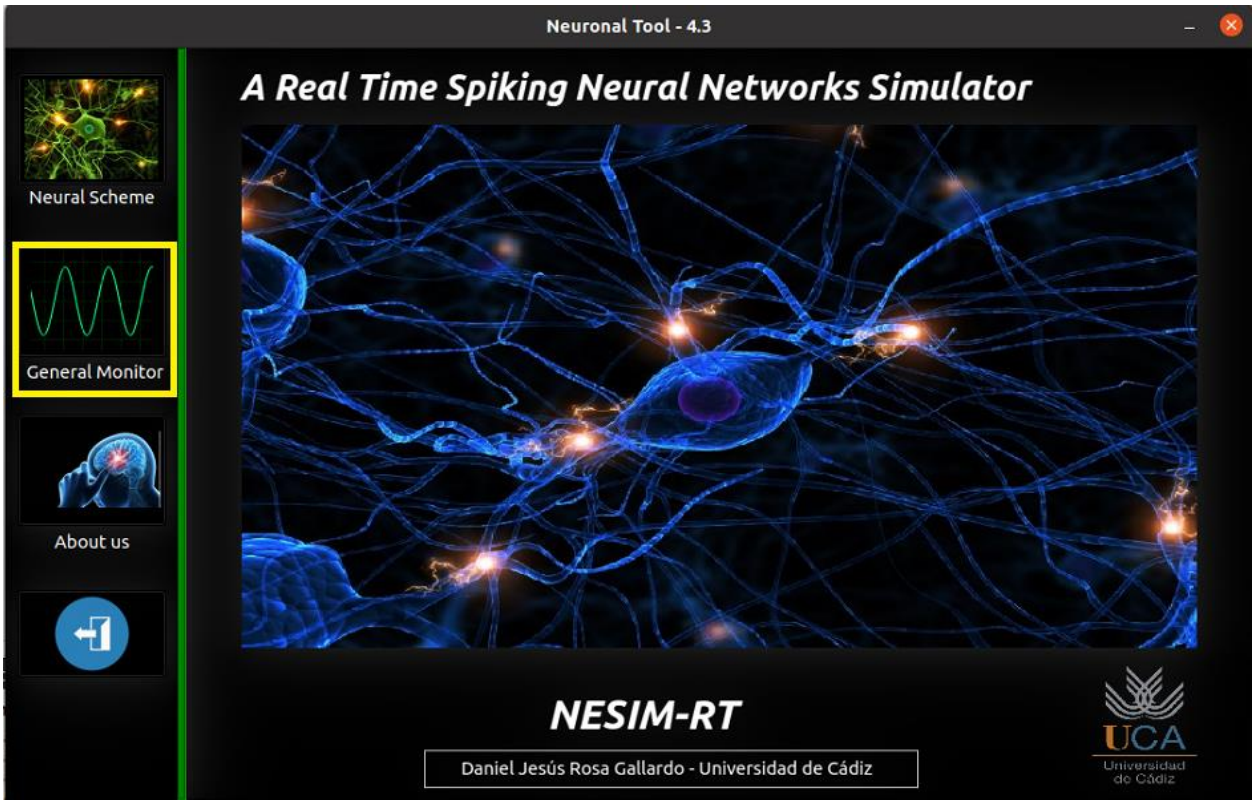
As can be seen in the layer at the top General Monitor is OFF.

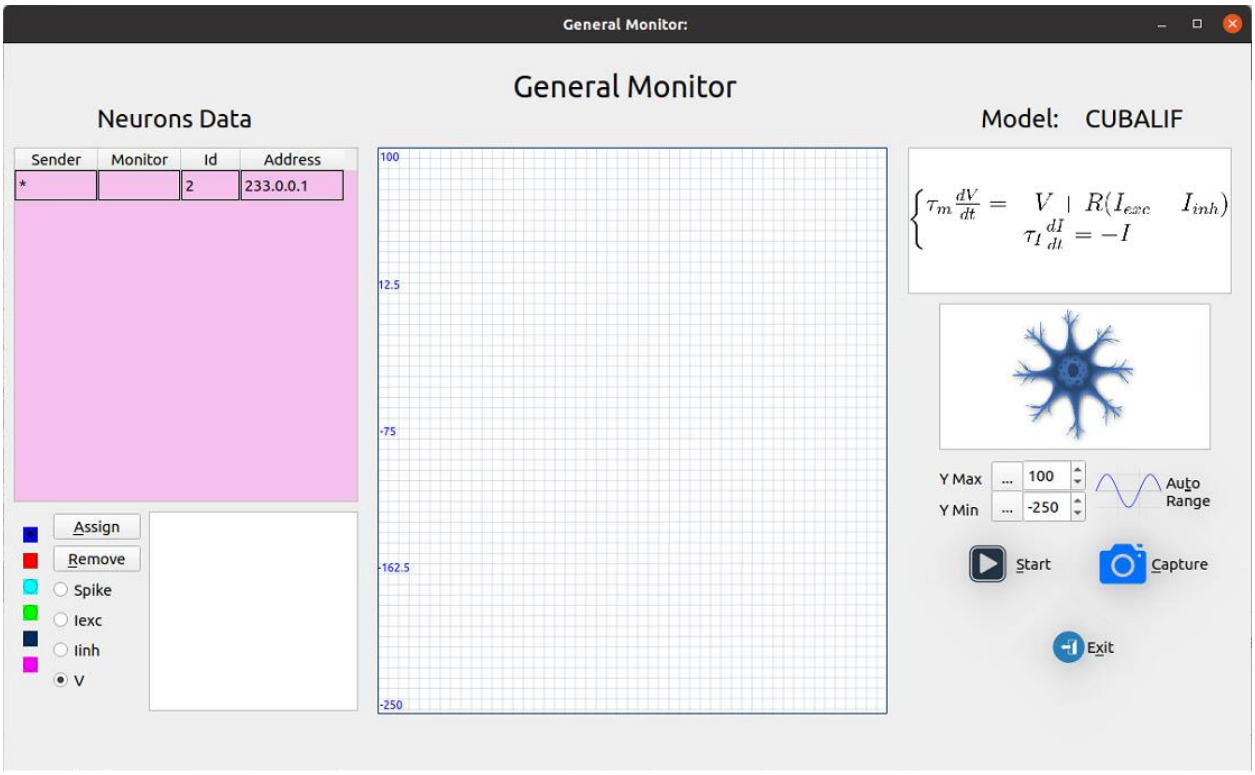


If we press the General Monitor button this label will change to ON.

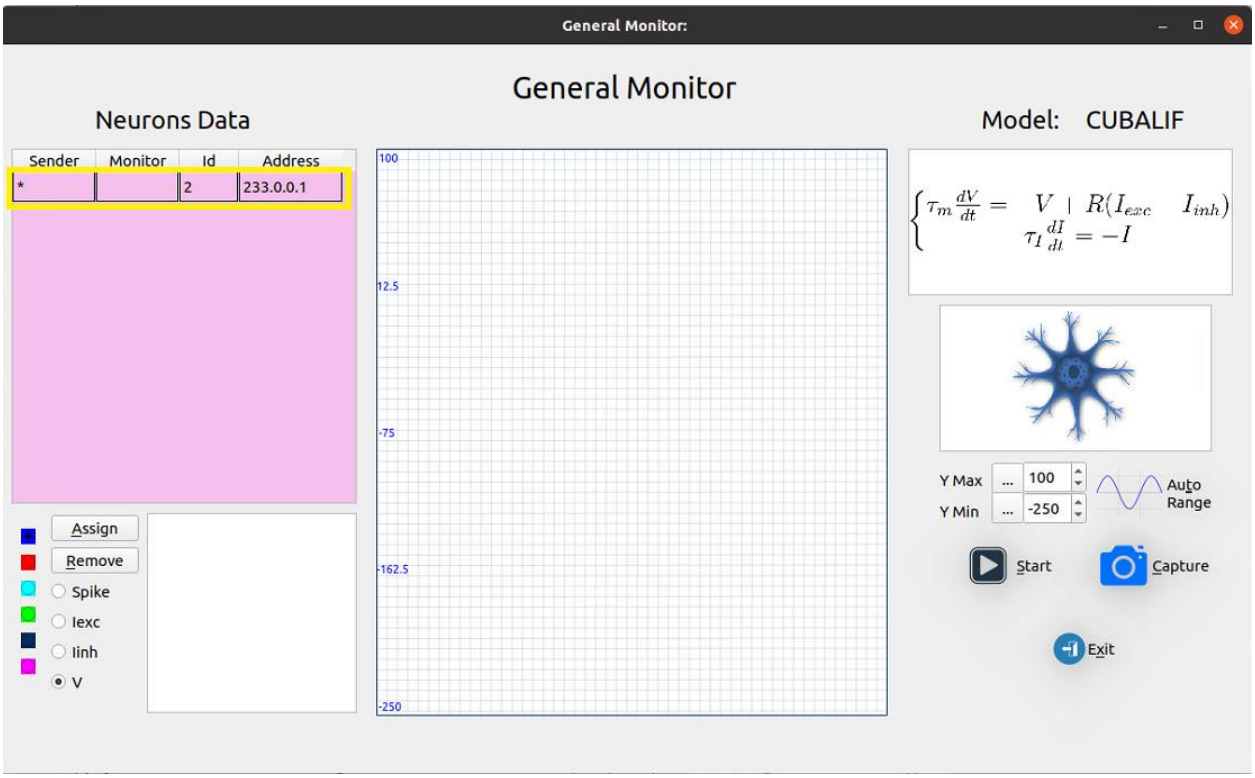


This means that the data is now being displayed on the General Monitor screen. To do this, go to the main screen of the application and press the "General Monitor" button.

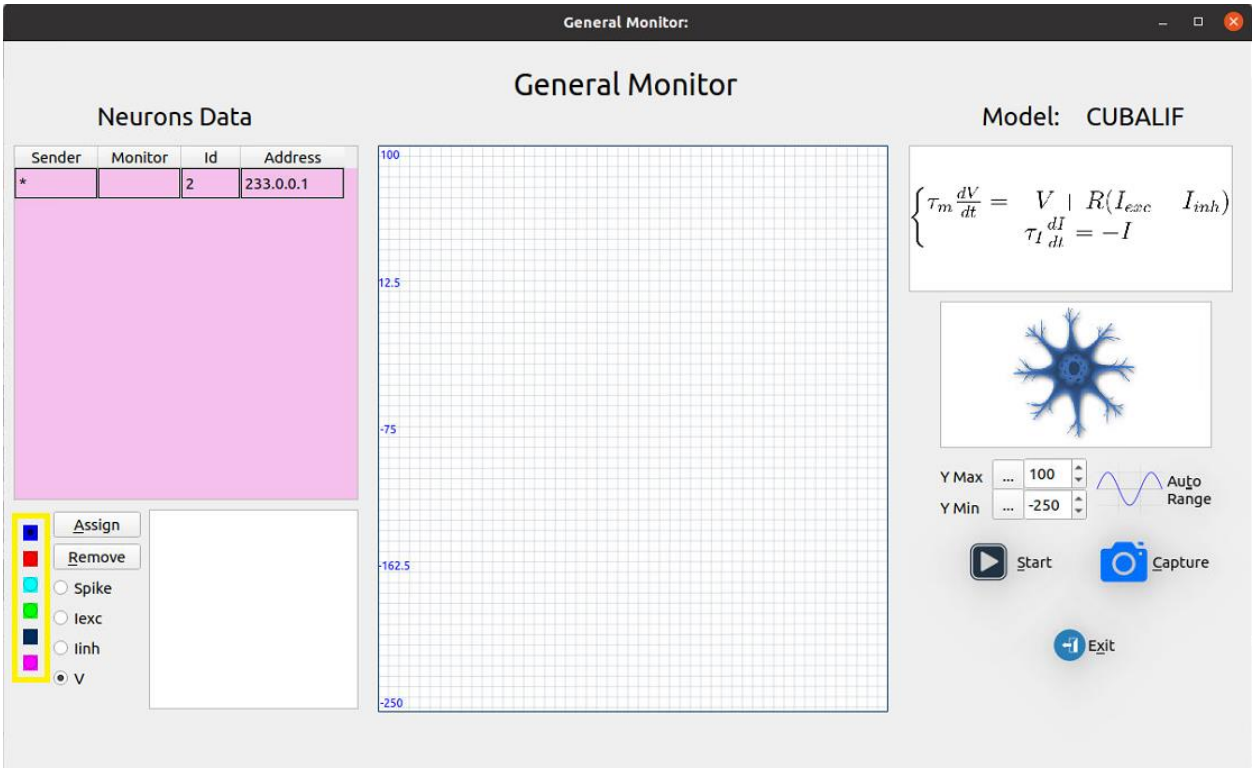




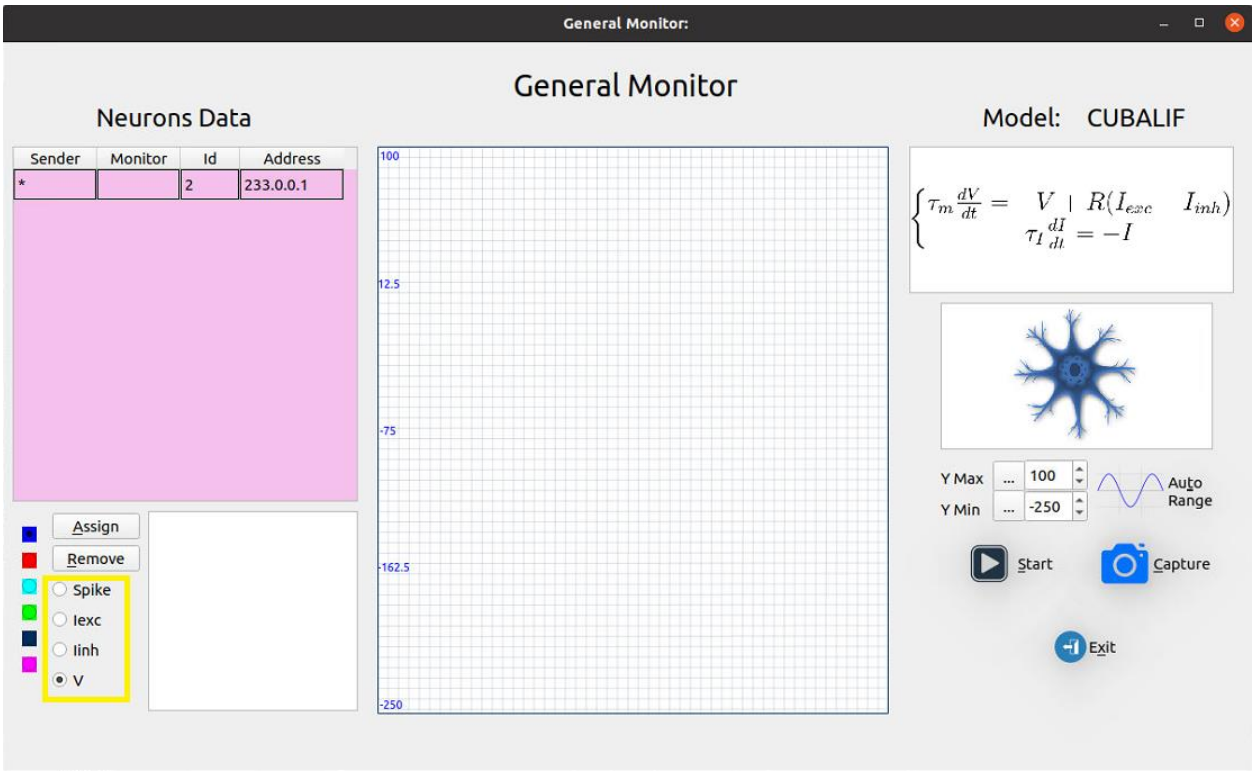
To see the activity of a neuron we must select:



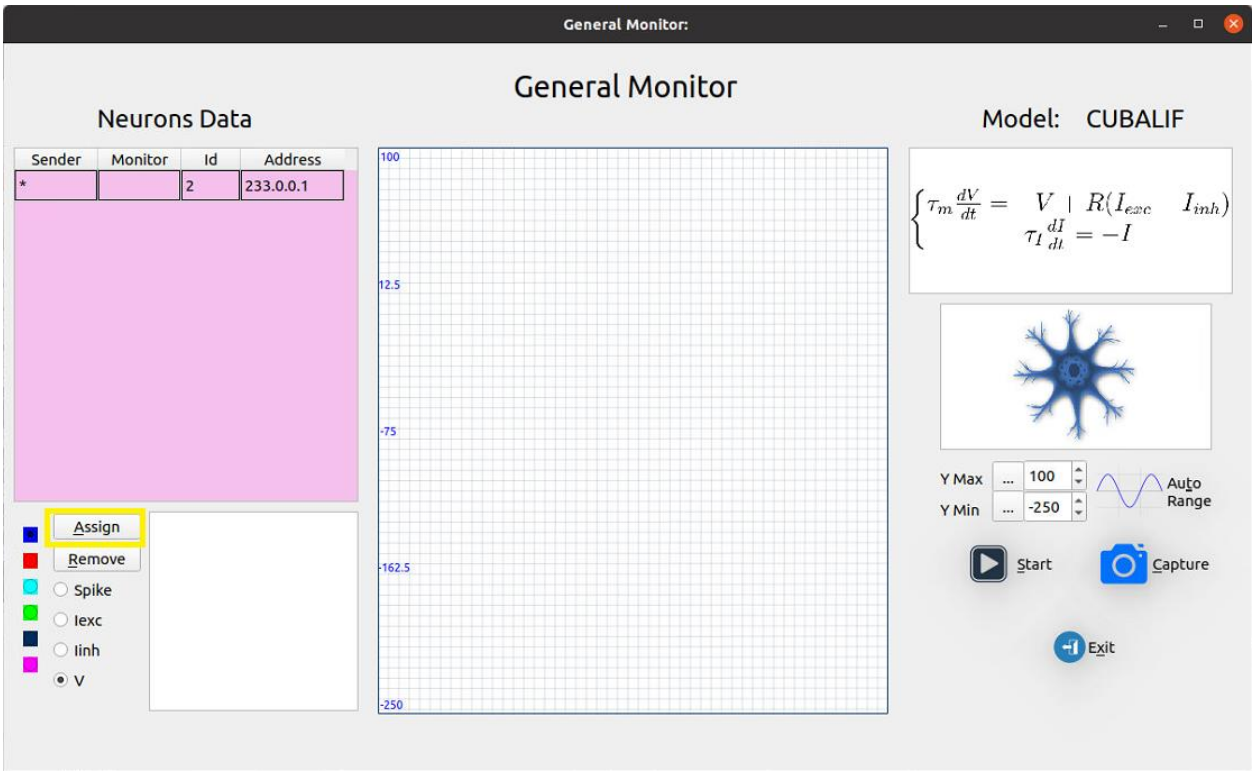
Then you must select the color with which you want to see in the graph:



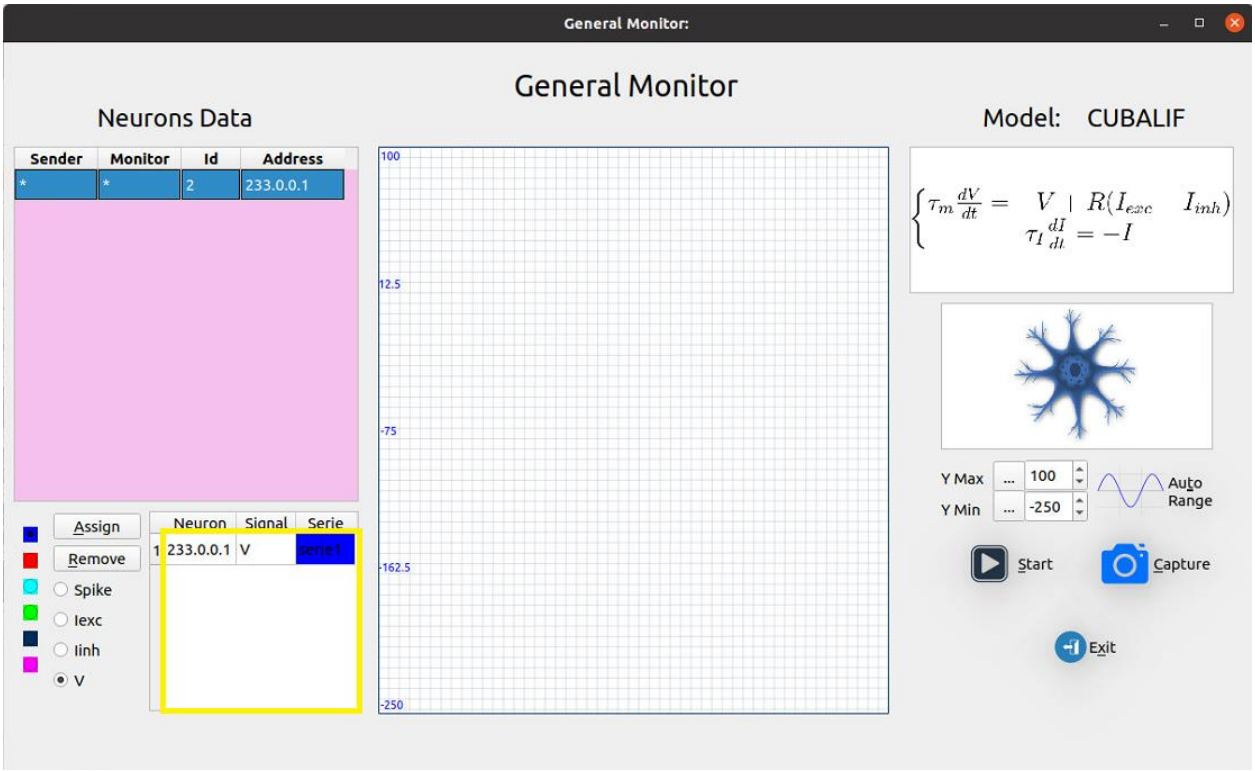
And finally the value of a scheme that you want to show:



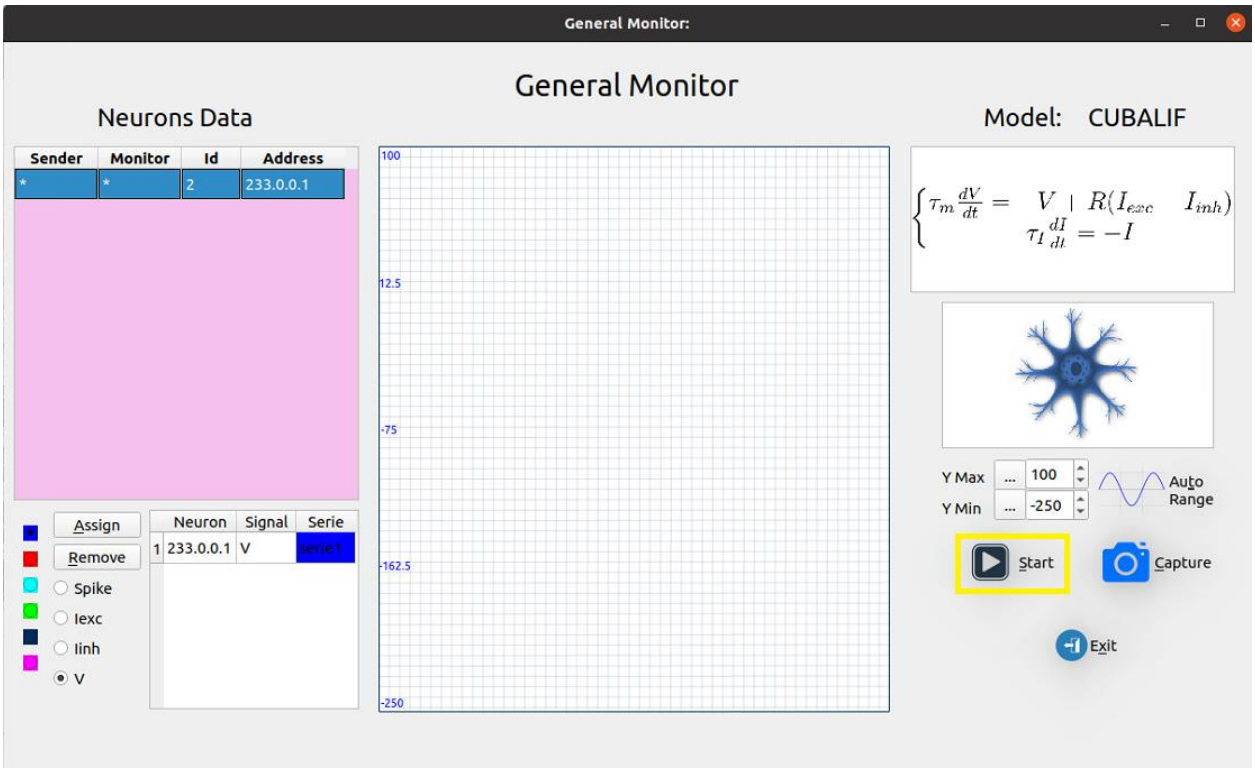
The “Assign” button is pressed:

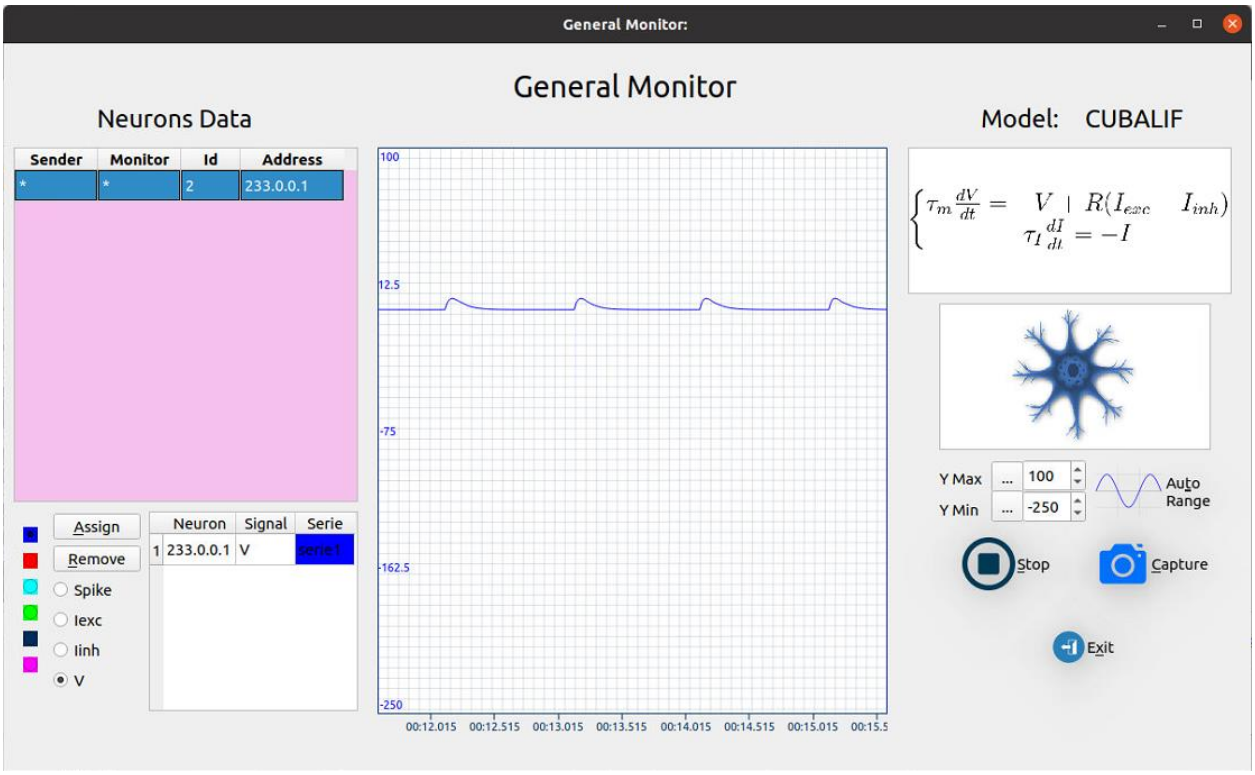


And it will appear inside the elements box:

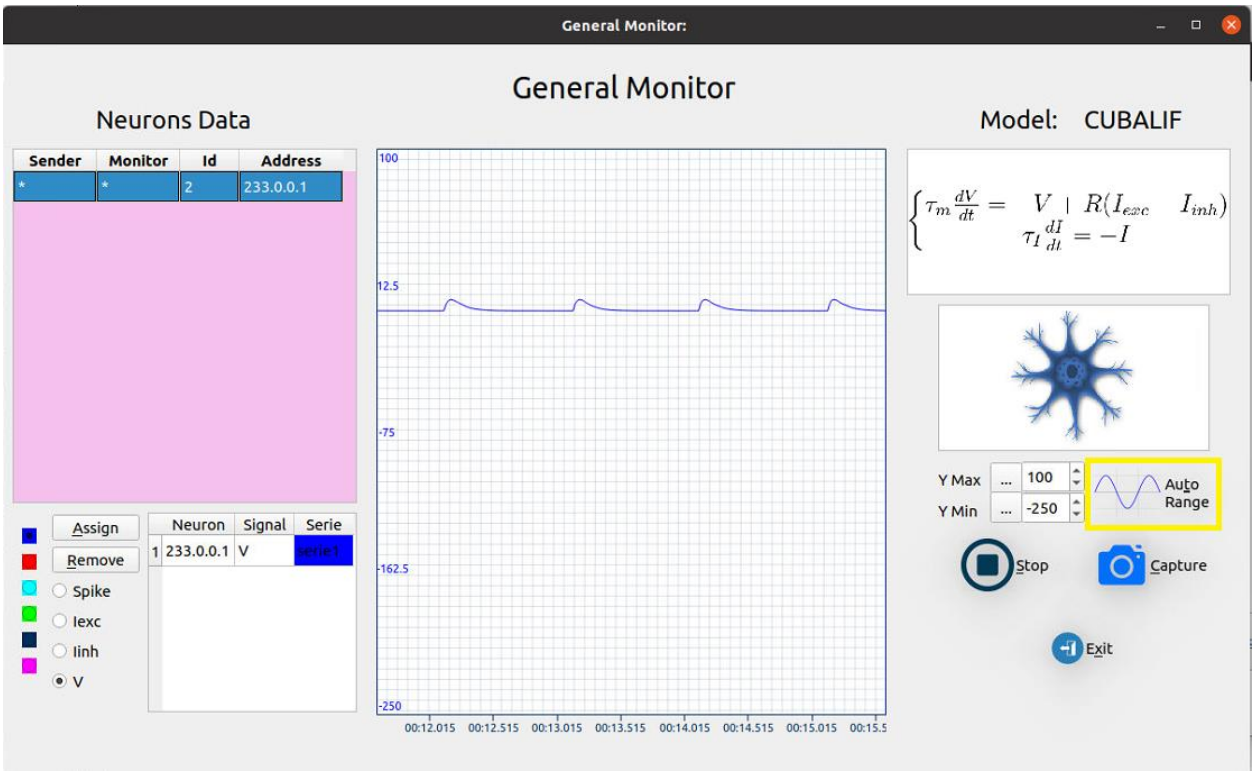


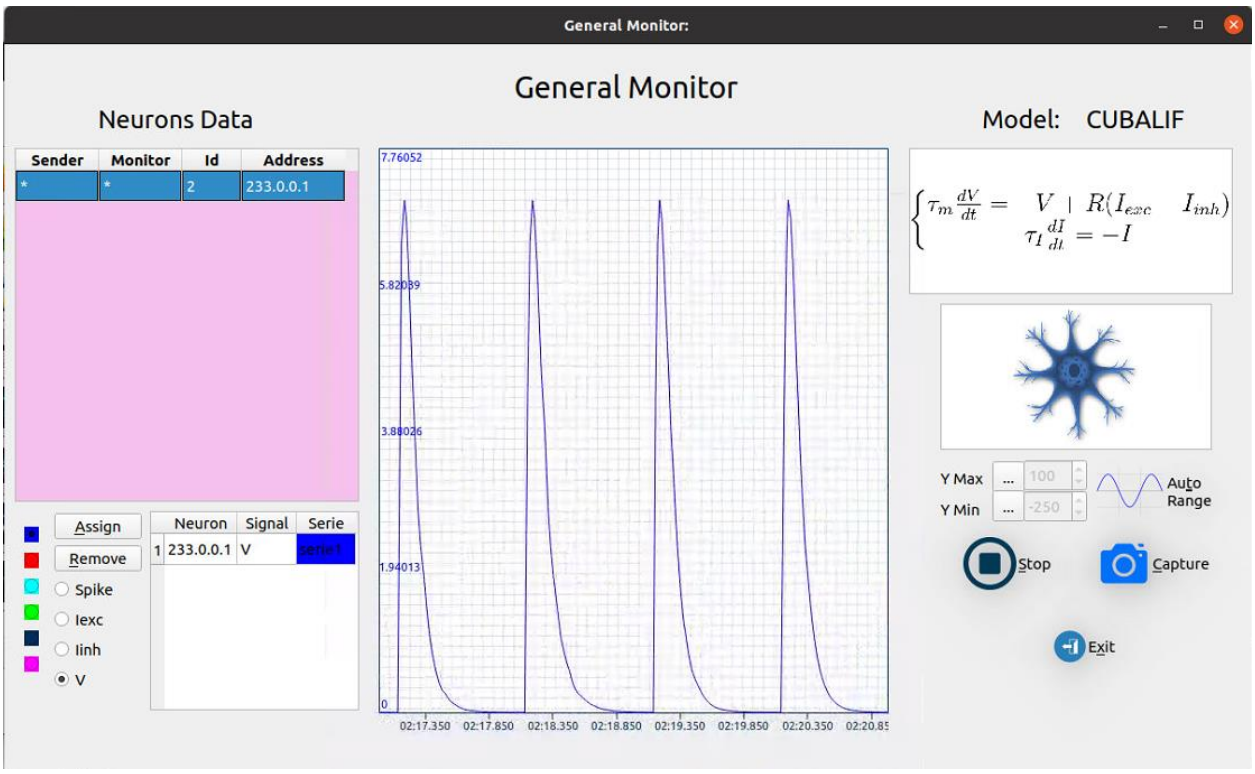
To see the values in the graph, you must press the “Start” button:



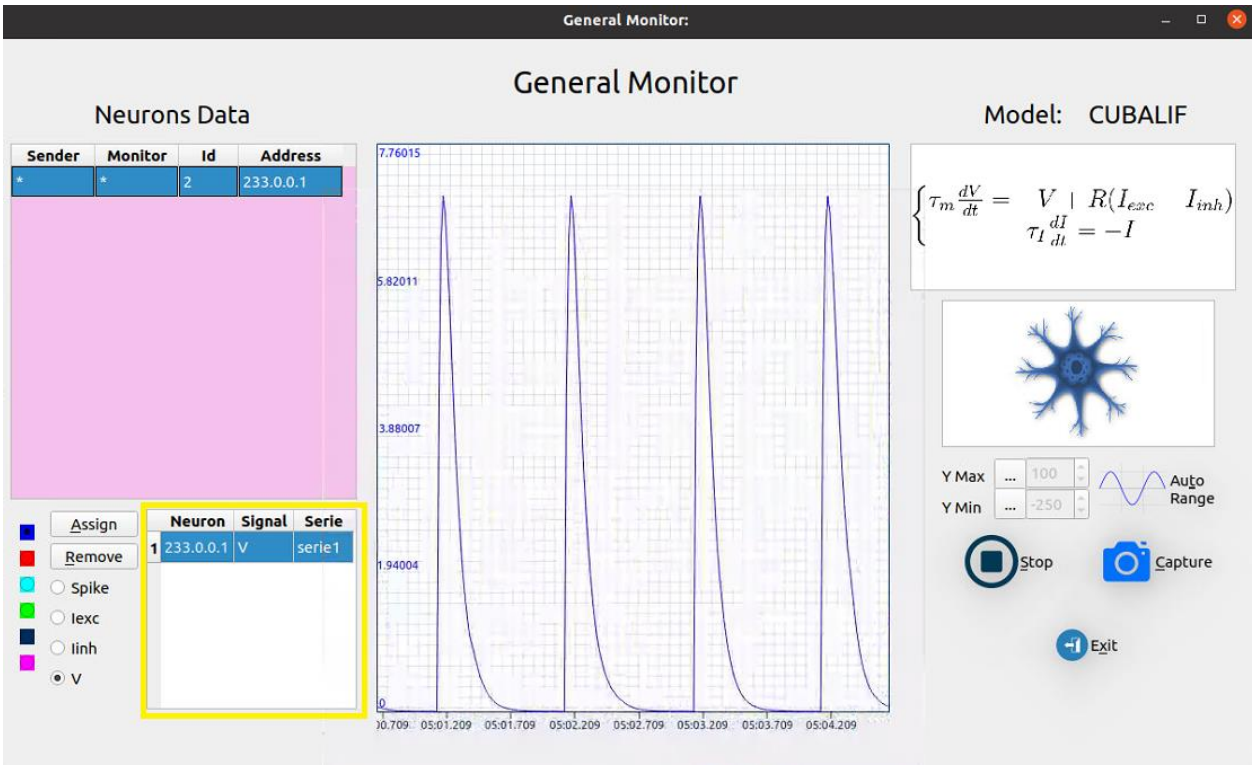


Again we can press the “Auto Range” button to show the maximum and minimum values automatically:

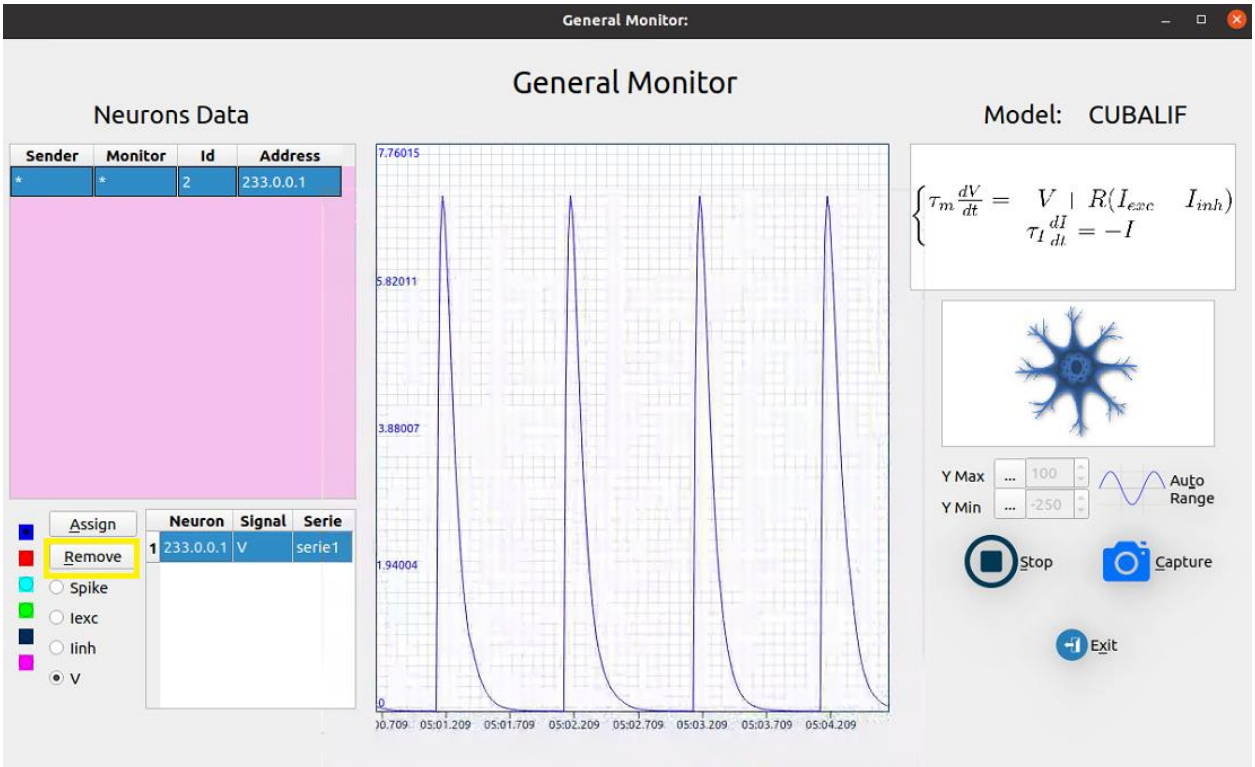


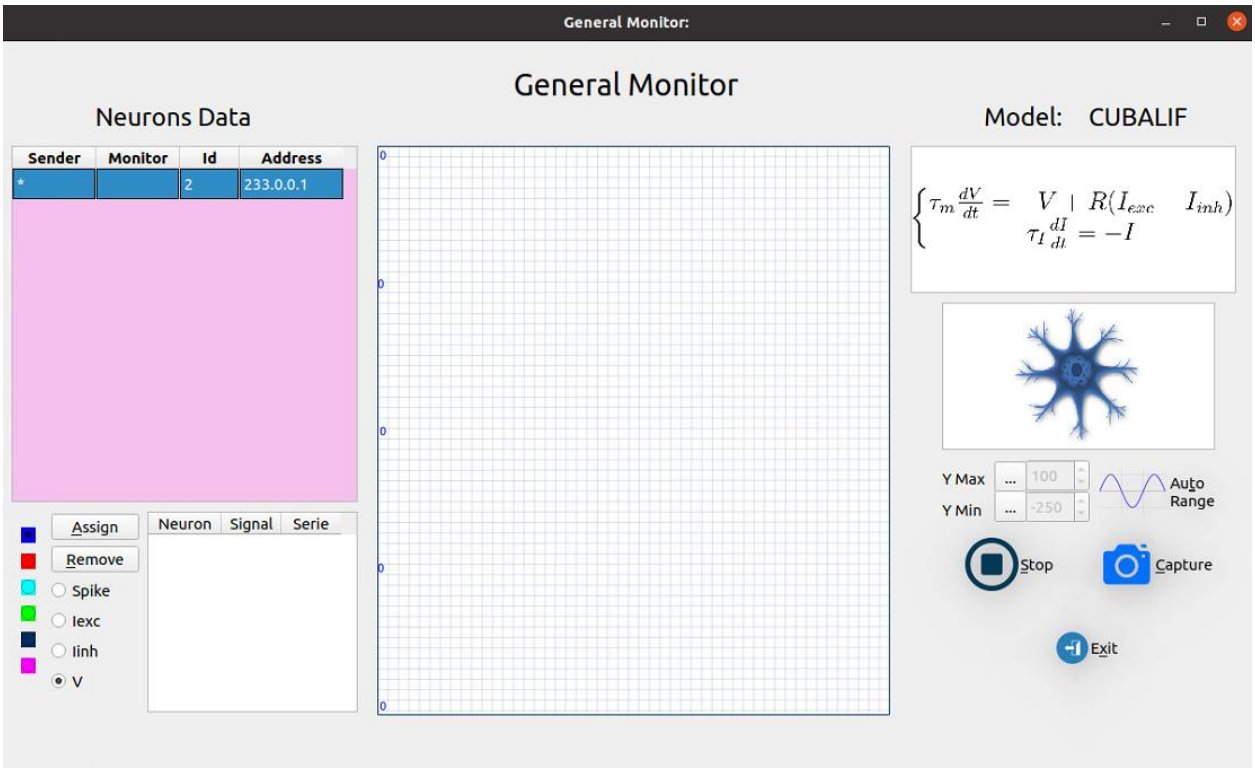


Finally you can delete one of the selected items in the items box:



And pressing the “Remove” button:

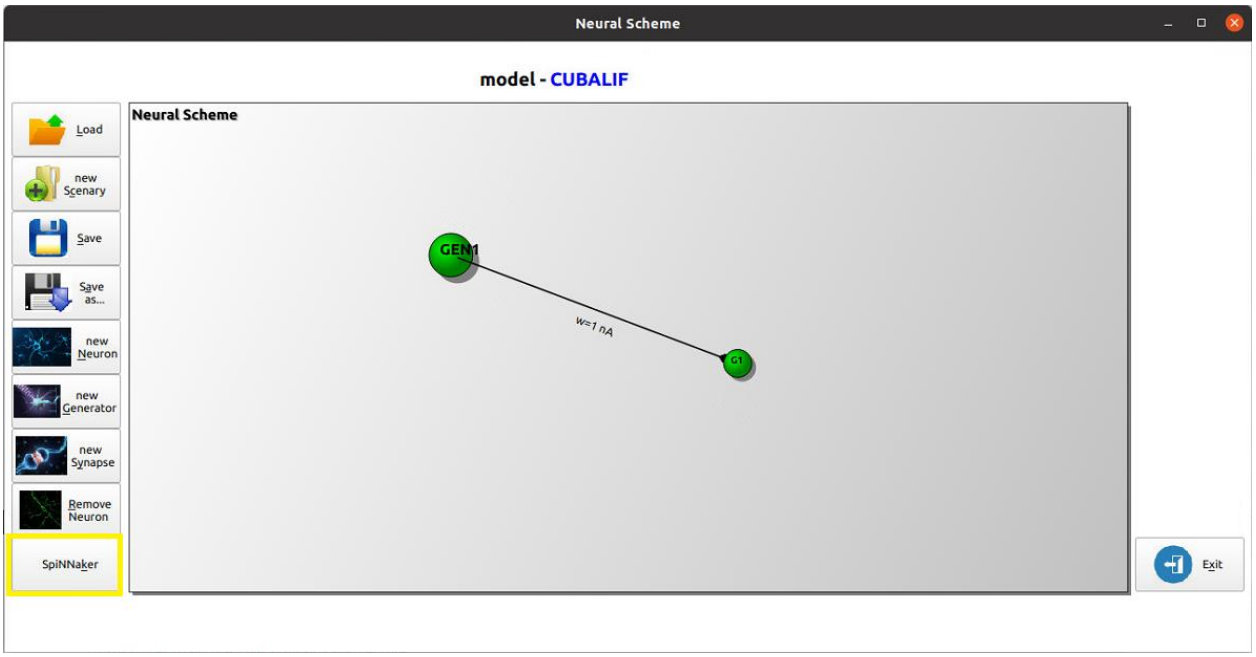




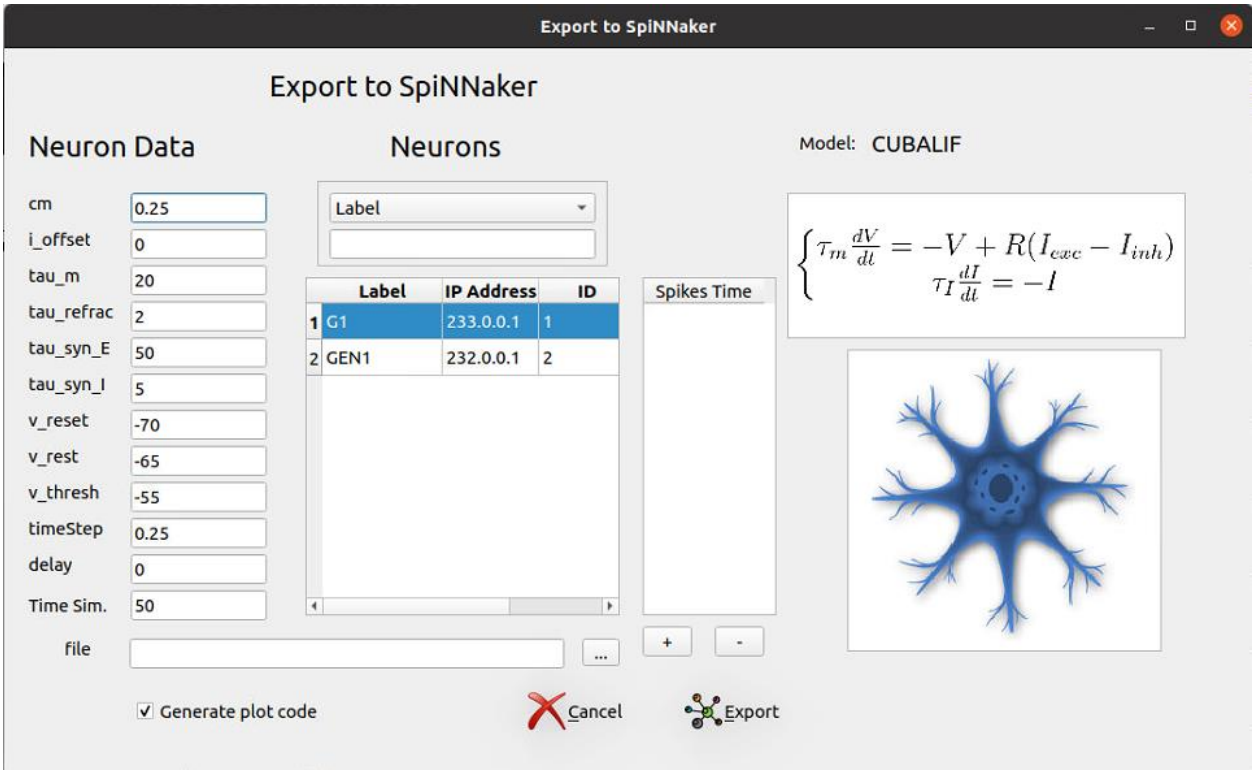
Export a script for SpiNNaker

To finish this manual we will explain how to export and execute a script to the SpiNNaker.

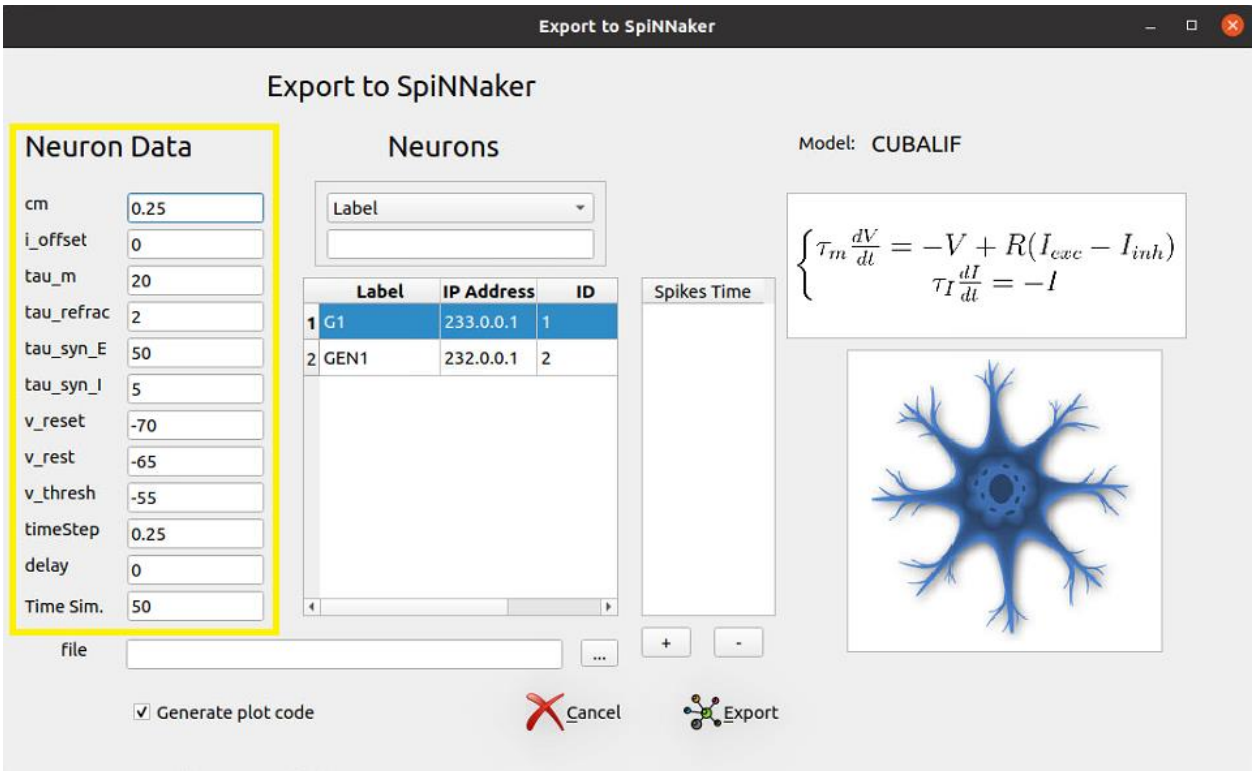
To do this, once the neural scheme has been created, we must press the spinnaker button:



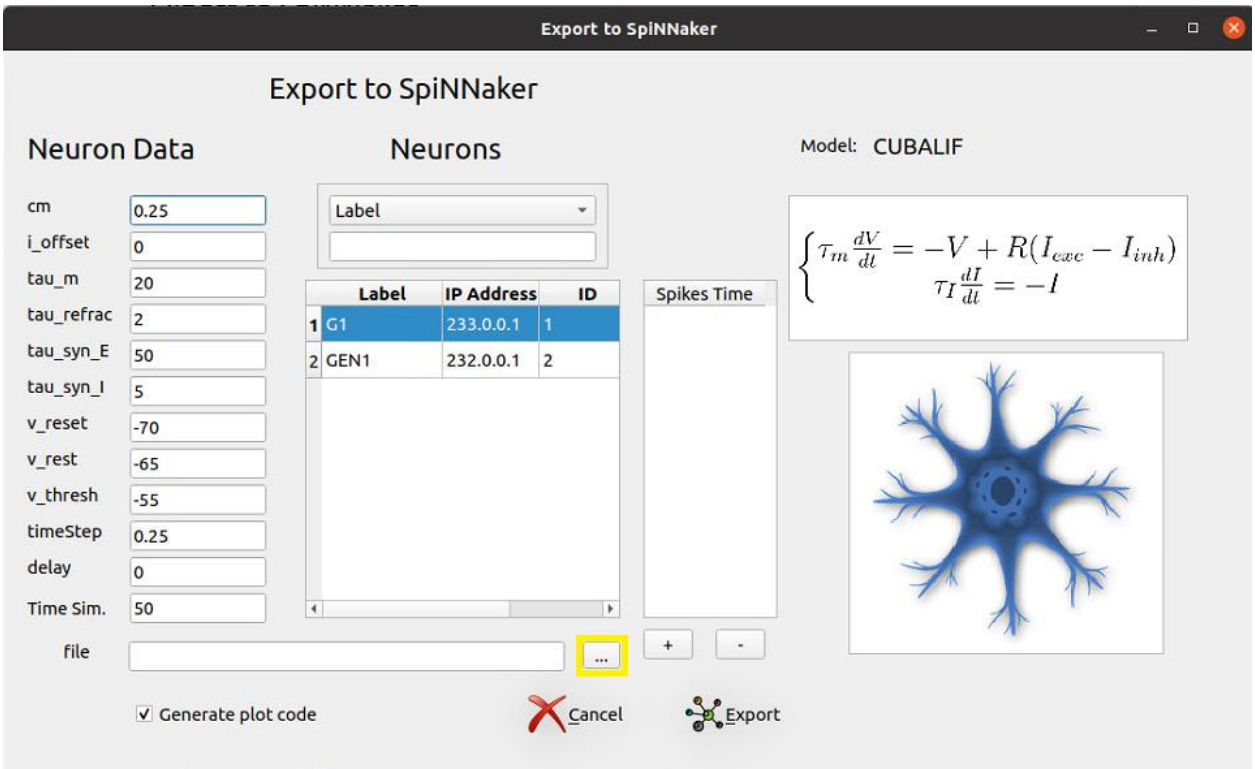
The new this window will appear:



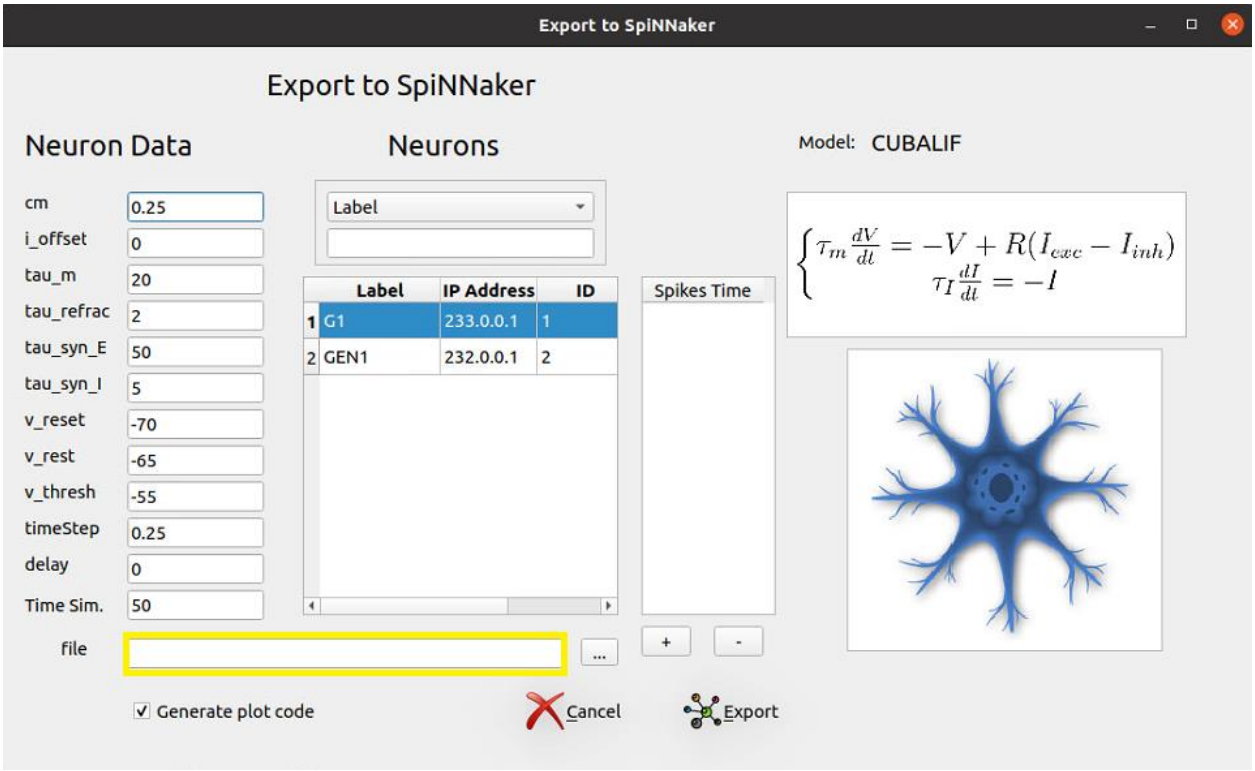
In it you can modify the values of the neuron to be exported:



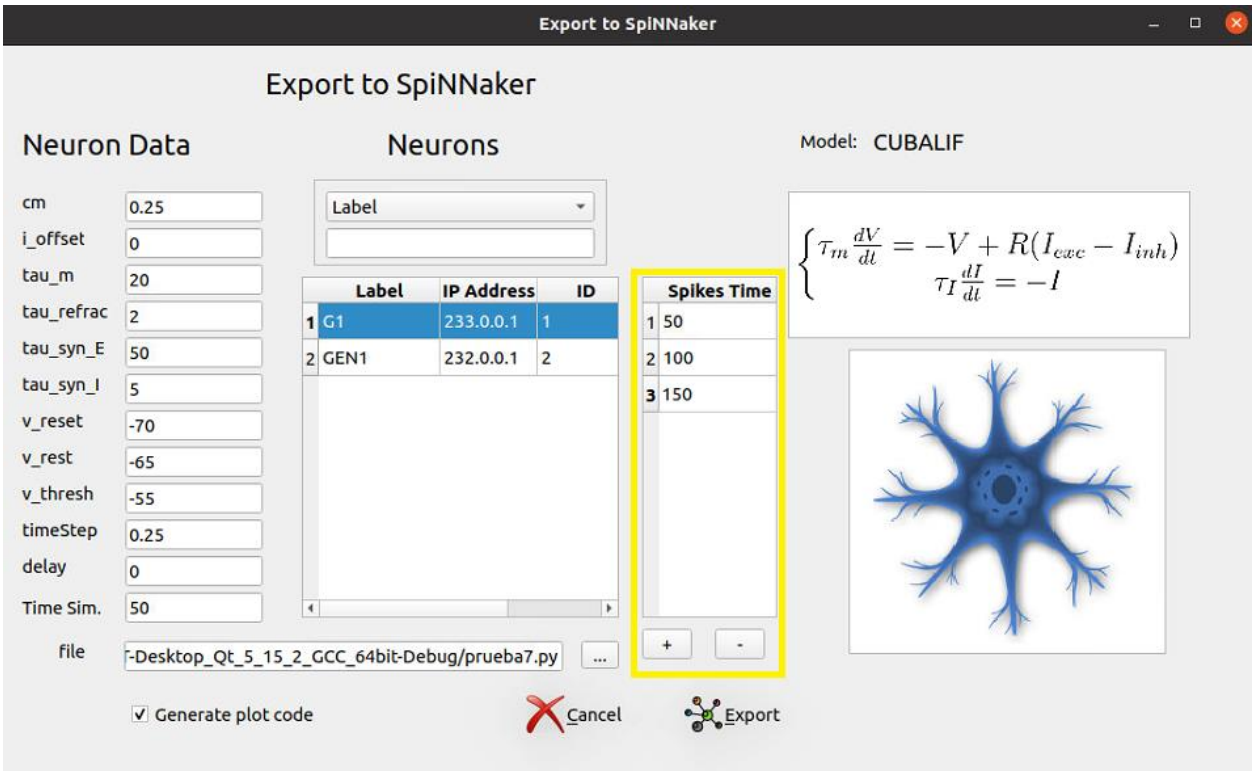
To export the script a route must be selected:



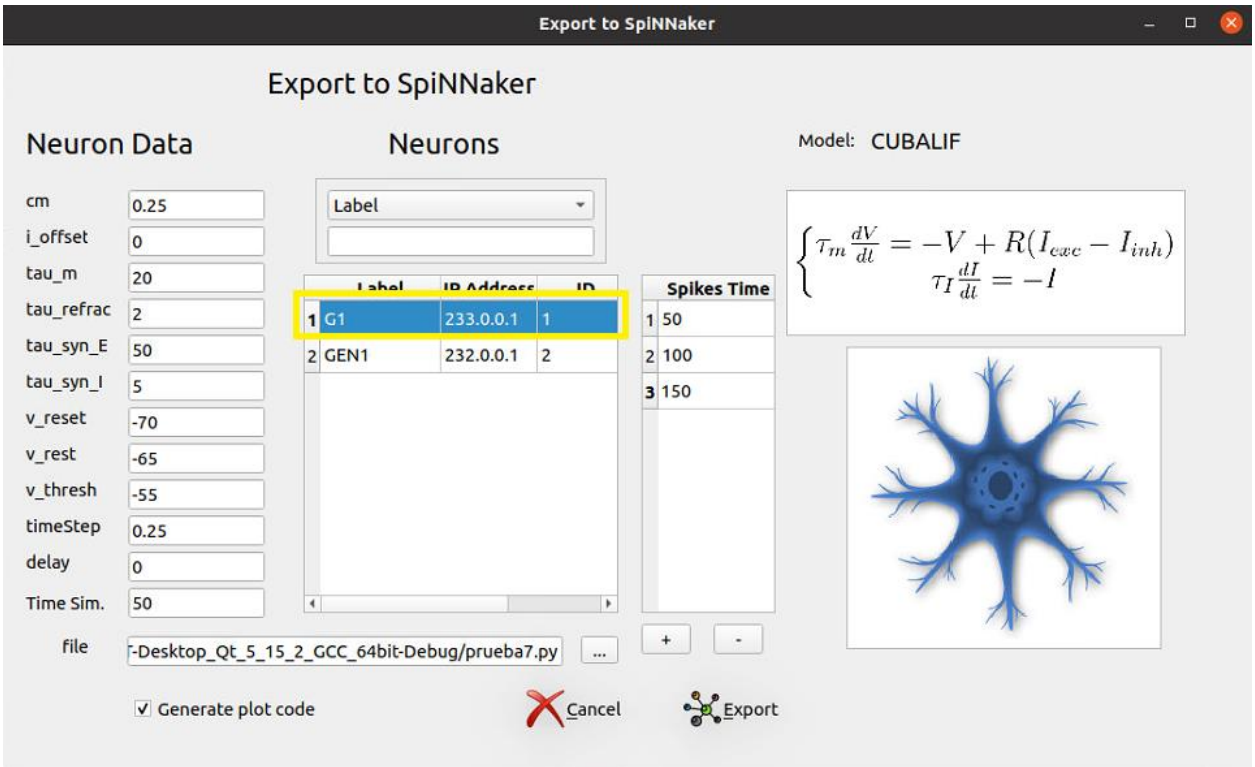
Write the name with which you want to export the script:



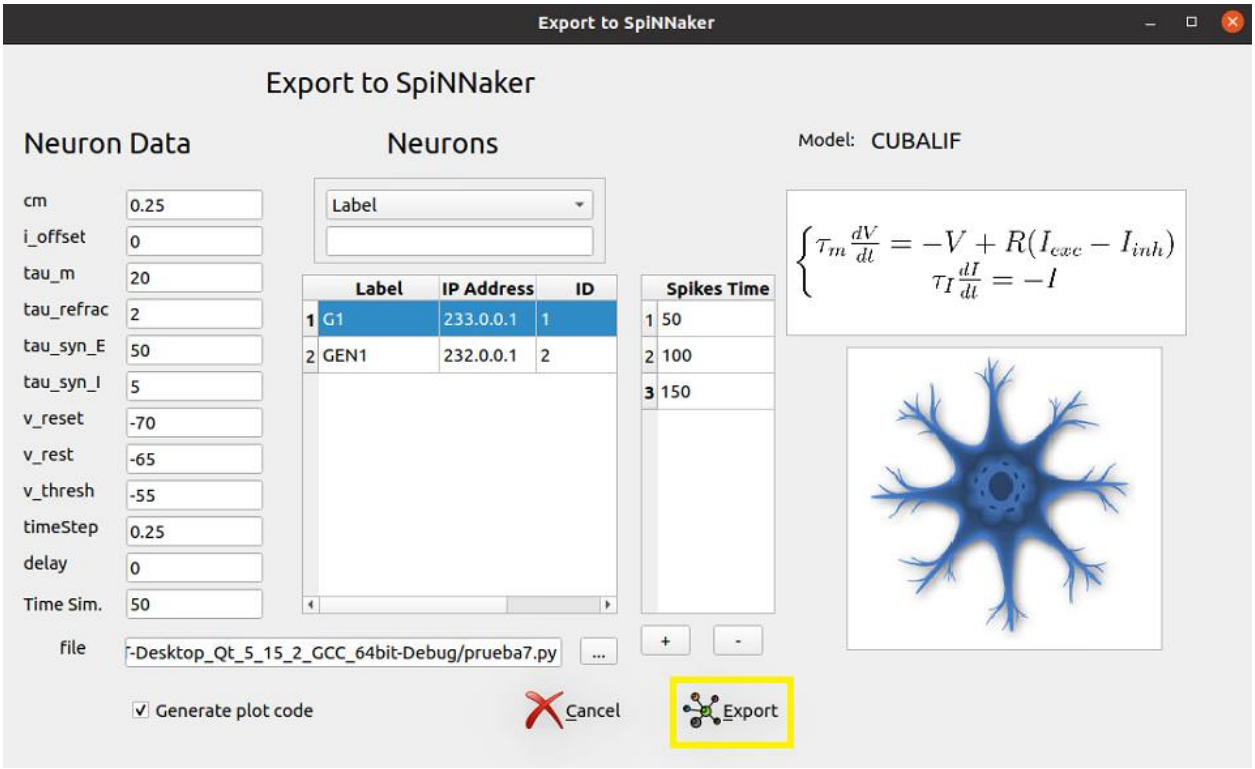
And add the times:



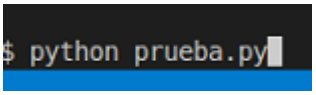
IMPORTANT when exporting the script, you must select the neuron you want to run:



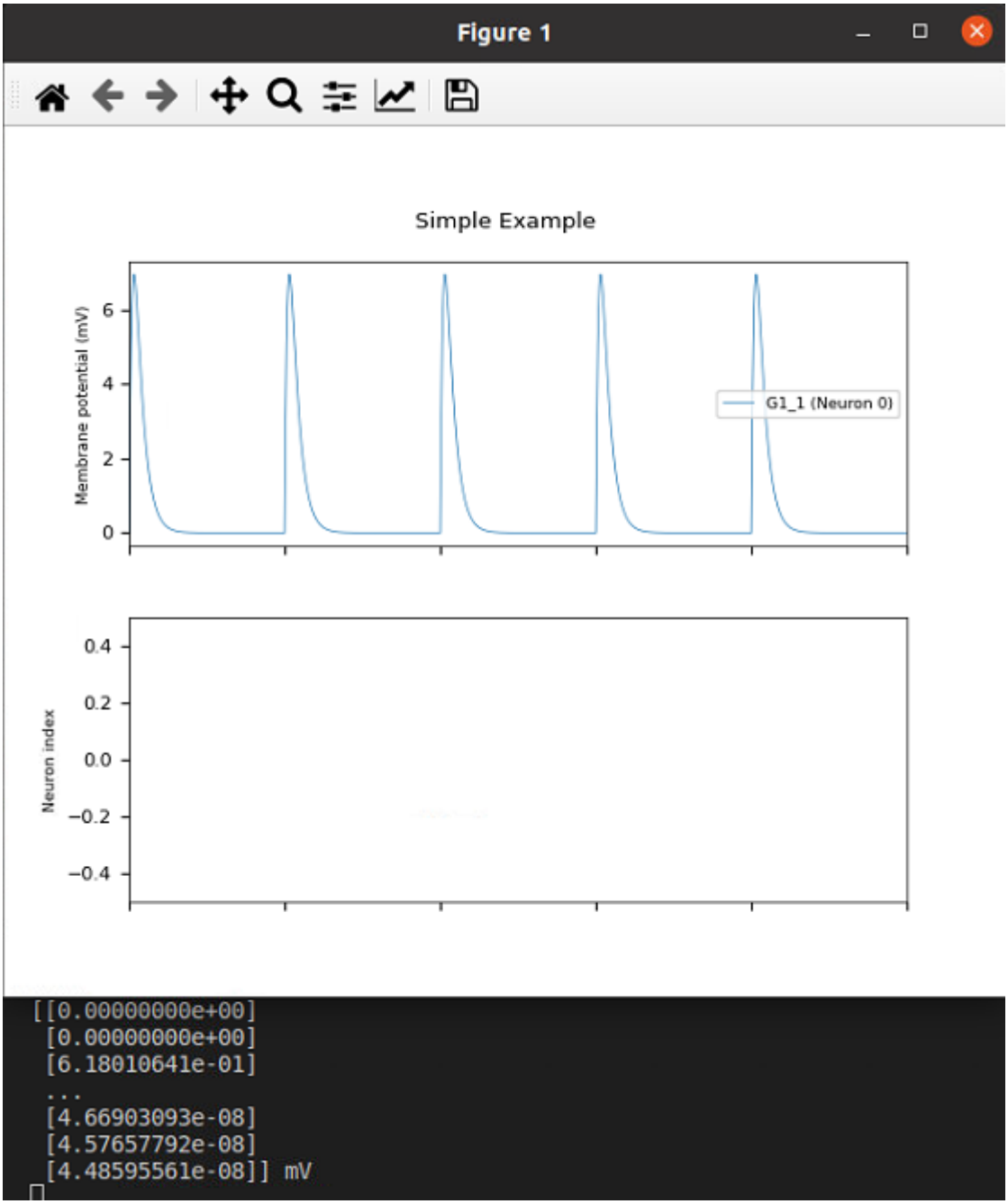
It is exported:



And finally the script is executed from the command line:



And finally the results are obtained after launching the experiment:




```
[[0.00000000e+00]
 [0.00000000e+00]
 [6.18010641e-01]
 ...
 [4.66903093e-08]
 [4.57657792e-08]
 [4.48595561e-08]] mV
```