# Quick guide to all the elements of the

# Spike Train Generator (STG)

**General remark:**   There are two different ways to generate spike trains. You can either use blocks with predefined spike train patterns or generate spike trains manually by adding, deleting and shifting individual spikes or groups of spikes. Both methods can also be combined. The first method is implemented via the lower panel ("Spike train patterns") whose elements are described below. The second method in which the mouse is used directly on the figure axis is described at the end.

**First Panel ("Main parameters"):**
This defines the main parameters of the spike trains to be generated.

**Edit "Number of spike trains":**     This will generate the desired number of empty spike trains.

**Edit "Start time":**     Beginning of the recording/simulation.

**Edit "End time":**     Termination of the recording/simulation.

**Edit "Sampling interval":**   Defines the temporal resolution of the recording/simulation.

**Button "Cancel":**   Brings you back to SPIKY.

**Button "OK":**   Accepts selected parameters and allows you to start generating spike trains.

**Second Panel ("Spike train patterns"):**

This panel is used for the first way of generating spike trains. Here you can select predefined spike train patterns for selected spike trains and selected time intervals.

**Subpanel "Time":**   This defines the subinterval in which the selected spike train patterns (see panel 'Patterns') will be generated.

**Edit "Start time":**   Defines the beginning of the subinterval in which the spike train patterns will be generated.

**Edit "End time":**   Defines the end of the subinterval in which the spike train patterns will be generated.

**Subpanel "Spike trains":**

Selects the spike trains for which the spike train patterns (see panel 'Patterns') will be generated.

**Popupmenu "Spike train selection":**   This allows you to choose if you would like the selected spike train patterns to appear in all (default) or only in selected spike trains or spike train groups (which you should define at the bottom of this panel).

**Edit "Trains":**   If 'Select trains' is selected, you can either identify the spike trains directly using Matlab notation or use the bottom below and select them from a list.

**Button "Select trains":**   This allows you to select the spike trains you would like to modify from a list.

**Edit "Groups":**   If 'Select groups' is selected, you can either identify the spike train groups directly using Matlab notation or use the bottom below and select them from a list.

**Button "Select groups":**   This allows you to select the spike train groups you would like to modify from a list.

**Edit "Group names":**   Before you can select spike train groups you should define them here. Identify their names each separated by ';' and a space and ending with a ';', e.g. 'G1; G2; G3; G4;' (without the apostrophes).

**Edit "Group sizes":**   Then identify their sizes using Matlab notation, e.g. '10 10 10 10' (without the apostrophes).

**Subpanel "Selection":**

This selects the spike train patterns which will be generated in the selected time interval for the selected spike trains.

**Checkbox "Periodic":**   This will generate identical periodic spike trains in the selected time interval for the selected spike trains.

**Edit "Rate":**   Select the firing rate of the (individual) identical periodic spike trains.

**Edit "Jitter":**   This will add jitter to the identical periodic spike trains.

**Checkbox "Splay":**   This will generate asynchronous spike trains (one of n! possible) in the selected time interval for the selected spike trains.

**Edit "Rate":**   Select the firing rate of the (individual) splay spike trains.

**Edit "Jitter":**   This will add jitter to the splay spike trains.

**Checkbox "Uniform":**   This will generate spike trains with uniform distribution in the selected time interval for the selected spike trains.

**Edit "Rate":**   Select the firing rate of the (individual) uniform spike trains.

**Checkbox "Poisson":**   This will generate Poisson spike trains in the selected time interval for the selected spike trains.

**Edit "Rate":**   Select the firing rate of the (individual) Poisson spike trains.


## Subpanel "Mode"

**Checkbox "Add":**   By activating this mode all newly generated spike train patterns will be added to the existing spikes in the selected time interval and selected spike trains.

**Checkbox "Replace":**   By activating this mode the existing spike trains occupying the selected time interval and selected spike trains will (first be deleted and then) be replaced by the newly generated spike train patterns.

**Button "OK":**   This generates the selected predefined spike train patterns for the selected spike trains and the selected time intervals.


## Lower buttons

**Button "Cancel":**   This brings you back to the 'main parameters' panel. To go immediately back to SPIKY, simply close the STG window (x in upper right corner).

**Button "Reset":**   This deletes all generated spikes and allows you to start again. The main parameters selected initially remain valid. In order to change these, press 'Cancel' next.

**Button "Done":**   This saves all spikes and redirects you to SPIKY where you can proceed with the analysis.

## Manual generation of spike trains:

Here we describe the second method to generate spike trains, the manual generation right on the figure axis by means of the mouse. You can create, delete and shift individual spikes as well as groups of spikes.

While you move the mouse within the axis, on top there is an ongoing display of the mouse position which identifies a time moment within a spike train.

You can create a new spike by clicking on the figure with the left mouse button. You can delete a spike by selecting a spike and either choosing the 'delete spike' option with the right mouse button or pressing the 'Delete' key on the keyboard. Finally, you can drag and drop a spike by picking it with the right mouse button, moving it to its desired location (which also can be in another spike train) and dropping it there by releasing the mouse button. However, dropping a spike over another spike is not allowed since for one spike train there can only be one spike at a time.

By simultaneously holding the SHIFT-key and pressing the left mouse button you can select all the spikes which are within the dashed rectangle spanned by the mouse. By simultaneously holding the CONTROL-key and pressing the left mouse button you can either select existing spikes or create and immediately select new spikes. In both cases (which can also be combined) the selected spikes can then be deleted / moved as a group.

By simultaneously pressing the CONTROL-key and C you can copy a spike or a group of spikes. They

These procedures (deleting and shifting of spikes or groups of spikes) can be applied to spikes that are both manually generated as well as generated from spike train patterns (via the second panel "Spike train patterns").

For the elements of the main GUI **(SPIKY)** please confer the file '**SPIKY-Elements.doc**'.

More information can be found here:

http://www.fi.isc.cnr.it/users/thomas.kreuz/Source-Code/Monitoring.html