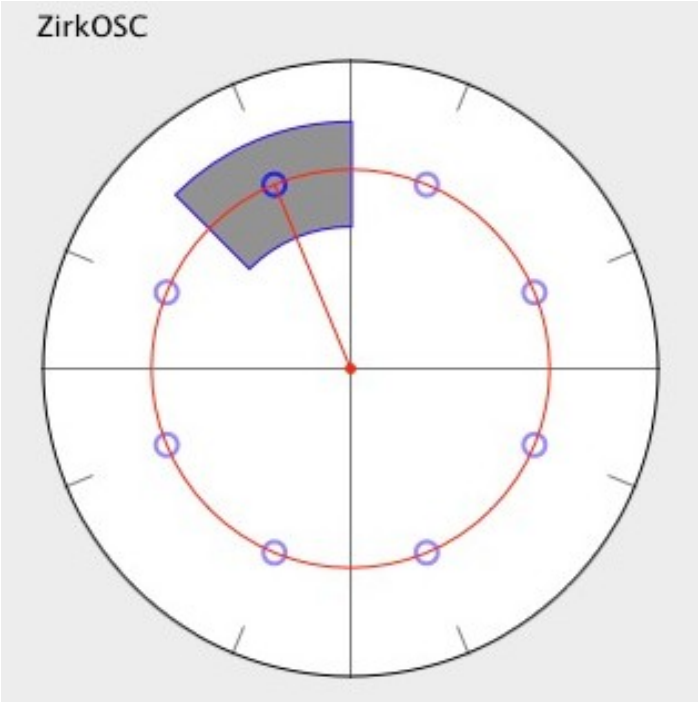
ZirkOSC2

Audio Unit and VST plugin for Zirkonium MKII



Groupe de recherche en immersion spatiale (GRIS)

Université de Montréal

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1. INTRODUCTION

Groupe de Recherche en Immersion Spatiale

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History

The ZirkOSC started to be developed in 2012. The first version was released in May 2012. Then the plugin was rewritten with JUCE and release in June 2013. The version 2 is under development since April 2014.

These instructions assume that you are familiar with:
— Jack manual
— Zirkonium MKII manual
— DP, Logic and Reaper manuals

Versions tested:
— OSX Mavericks (10.9.5)
— Jack 0.9b17
http://www.jackosx.com/
— Zirkonium MKII 1.0.9
http://zkm.de/en/node/21606
— ZirkOSC2 2.1.0 (April 15, 2015
https://github.com/GRIS-UdeM/ZirkOSC2/releases
— Digital Performer 8.07 (64 bits)
— Logic X 10.1.1 (64 bits)
— Reaper 4.77 (64 bits)

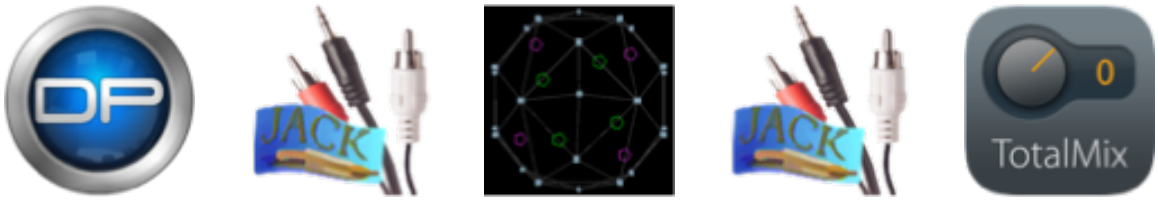
ZirkOSC2

The ZirkOSC2 is a plugin (AU and VST format) designed to control the Zirkonium MKII from any compatible audio sequencer on a Mac. It allows the user to spatialize the sound in 3D under a dome of speakers.

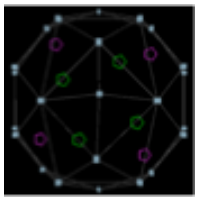
The setup

The whole setup includes these elements:

Audio:
DAW —> Jack —> Zirkonium —> Jack —> Interface



OSC:
ZirkOSC2 —> Zirkonium

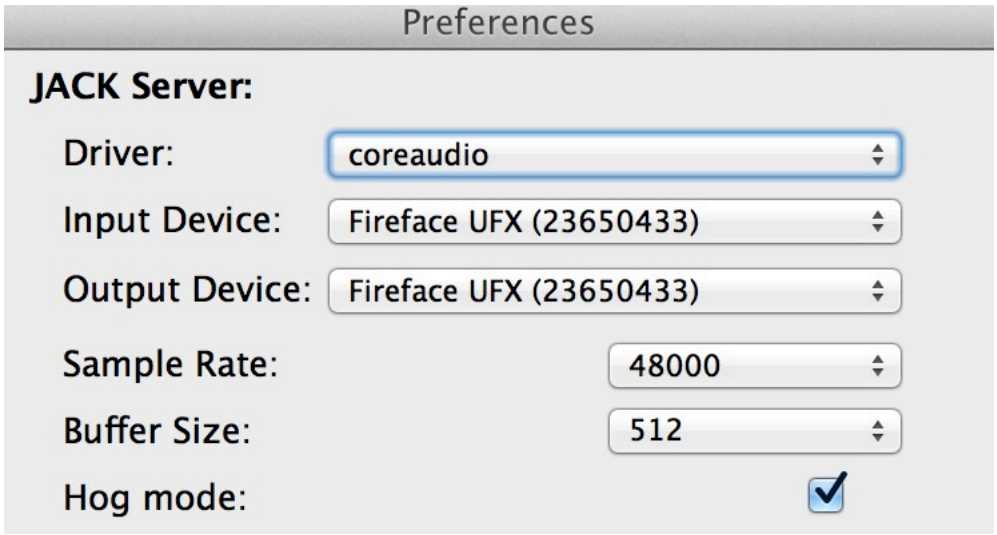


General Warning

The sampling frequency (Fs) has to be set to the same value within every software. Jack is not changing its Fs dynamically and DP remembers the last Fs used. Therefore, if Jack is set at 48k and the last session opened in DP is at 44,1k, when DP is launched the whole setup will crash (don't try to fix that: you will have to reboot the Mac). Therefore, you have to open Jack, Zirkonium and DP separately and set them at the same Fs before joining them together.

Hog Mode in Jack

There is an option in the Jack Preferences to block a sampling frequency change, the Hog mode:



«Checking this option will prevent other audio applications from adjusting the sample rate of the selected Input and Output Devices. If this option is not checked, and another application changes the sample rate of either the Input or Output Device while the Jack server is running, the Jack server will stop, and a dialog will be displayed alerting the user.» — Jack manual.

Audio Settings in Zirkonium MKII

The audio settings in the Zirkonium MKII should be set to anything but the audio interface that will be used by Jack. These settings should be set to the Built-In output for example when configuring the Zirkonium (they will have to be changed later to JackRouter). If it is not done before opening Jack, the Zirkonium will crash.

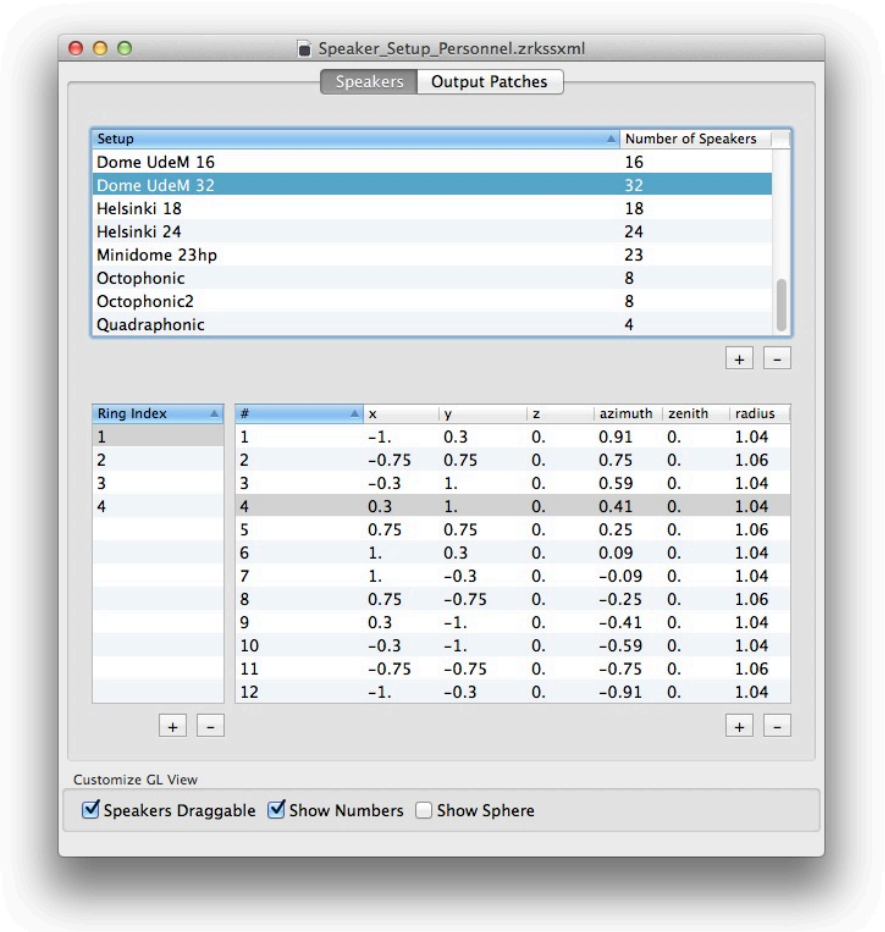
2. ZIRKONIUM MKII

The Zirkonium was developed at the Zentrum für Kunst und Medientechnologie (ZKM) in Karlsruhe (Germany). It is based on the Vector Base Amplitude Panning algorithm developed in Helsinky by Ville Pulkki.
The Zirkonium MKII is made of three elements:
— The Spatialization Server that is used to spatialize the sound
— The Speaker Setup that is used to design the speakers' setup
— The Trajectory Editor that is used to draw trajectories (we will not use this last one in this manual, sine our plugin, the ZirkOSC2, has the same fucntion).

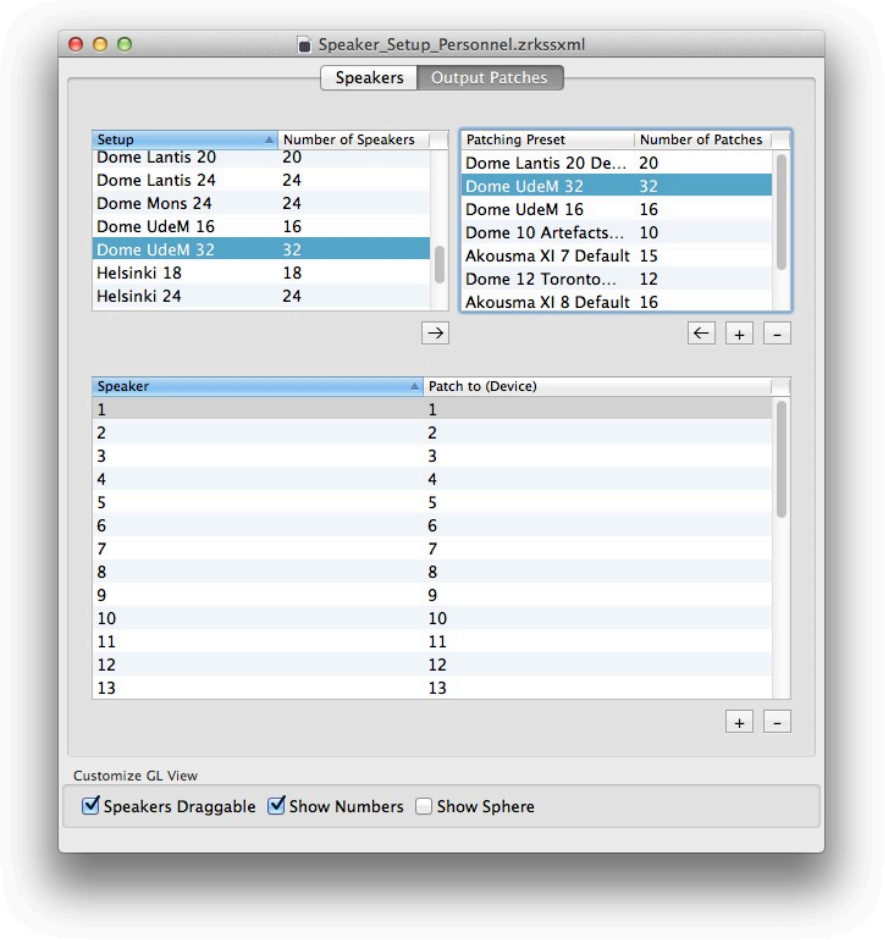
2.1. Speaker Setup

Speakers location and Output Patches should be designed in the **Speaker Setup** prior to the use of the Zirkonium (see Zirkonium MKII manual for more information).

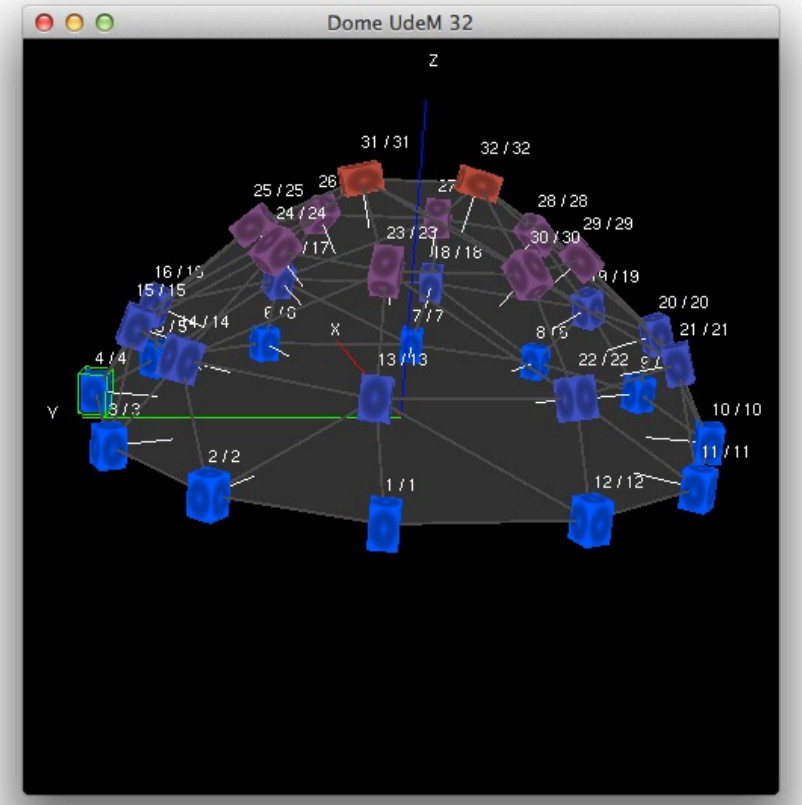
A **Speakers** configuration has to be designed by determining the number of ring indexes, the number of speakers in each of them and their location:



An **Output Patch** should match the number of outputs send to the speakers (a 32 speakers dome used in this example):

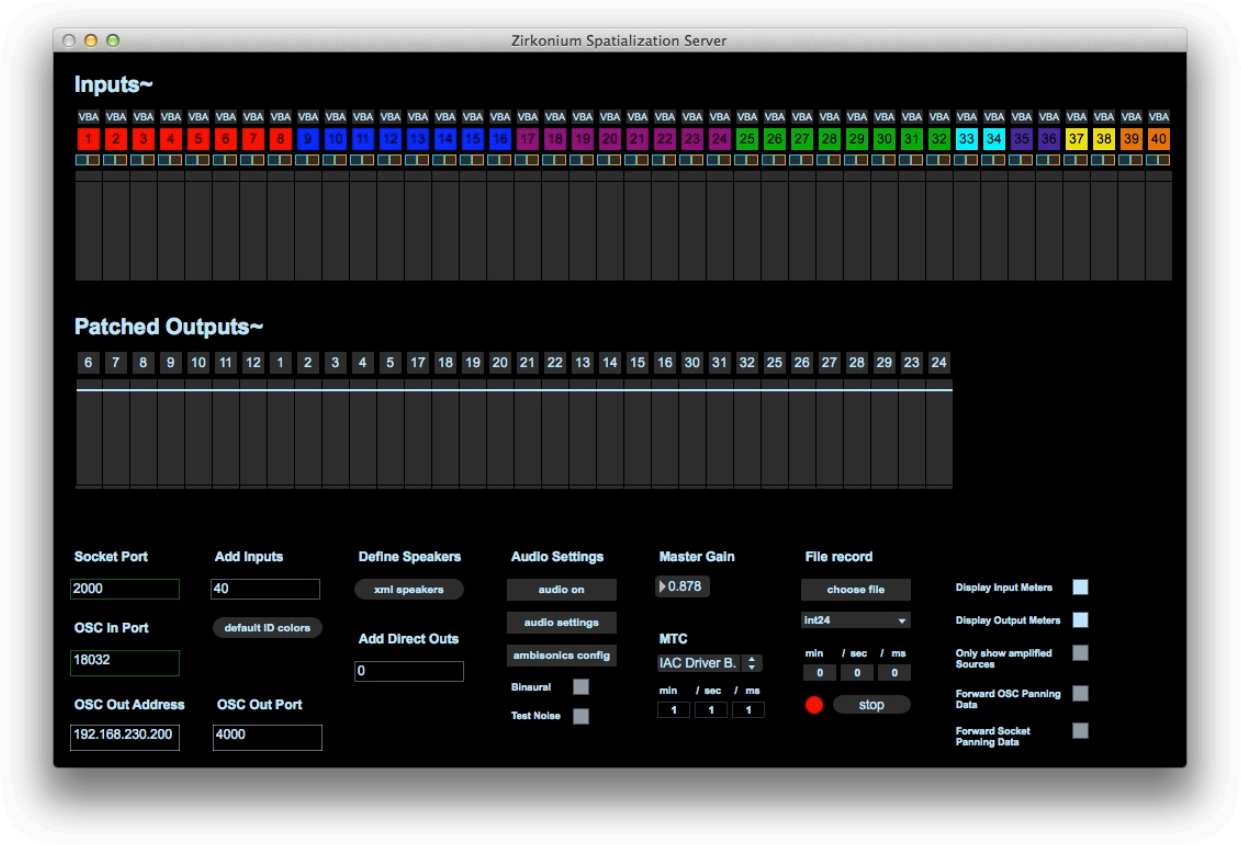


The result can be viewed in the 3D window:



2.2. Spatialization Server

The Server is made of all the necessary settings to send the signal from the DAW to the speakers (see the Spatialization Server manual for more information). The two main sections are the Inputs~ (from the DAW through Jack) and the Patched Outputs~ (to the speakers also through Jack). In this example, the inputs are made of 4 X octophonic tracks plus 4 X stereo tracks, for a total of 40 tracks identified by different colors, distributed on the 32 speakers dome designed in the Speaker Setup:



2.3. Naming and Saving

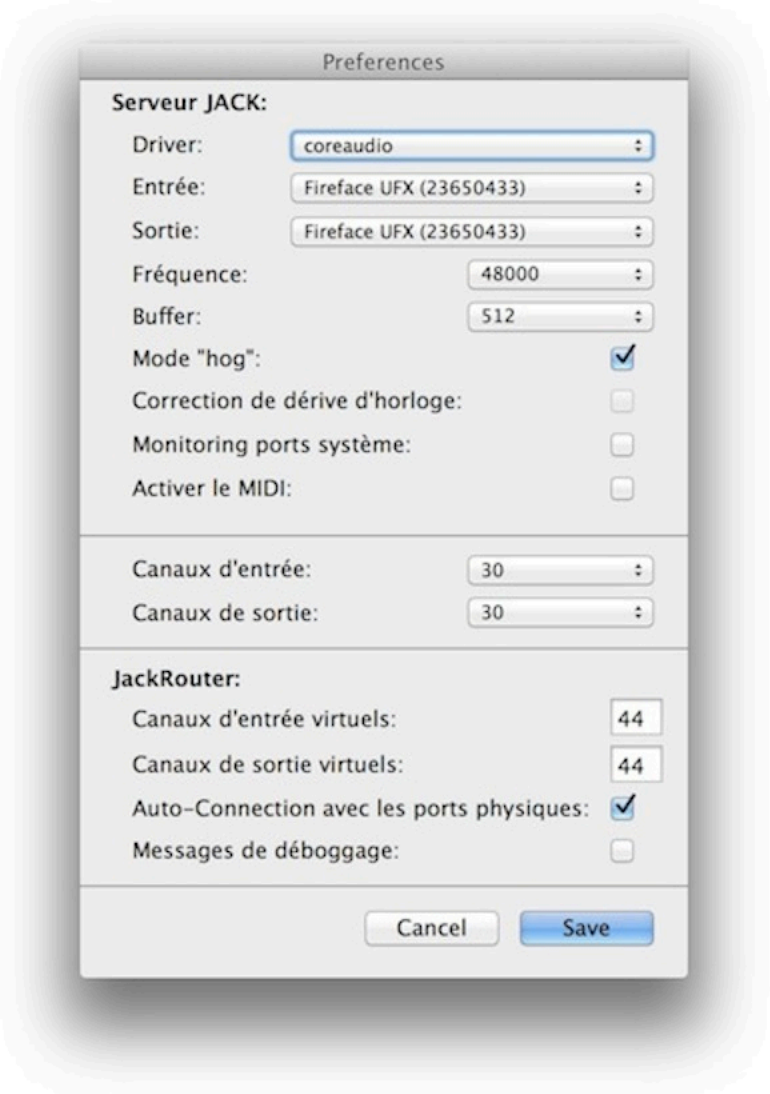
Be careful, Speaker Setup and Spatialization Server don't save your work by default and if you close them, they will not warn you that your work hasn't been saved! Also, all the documents made in any of the Zirkonium applications are saved under the format of .xml files that could be confusing since Server documents are not the same than Speakers document, nor Trajectory documents. So be careful by properly labelling your files and put them in different folders.

3. Connecting everything

3.1. Open Jack

3.1.1. Open Preferences

Chose interface (Input-Output), the Sampling Frequency, the interface number of Channels (the maximum is determined by the Audio Interface itself) and the Virtual ones (those who will really be used) and save your preferences.
IMPORTANT. The Virtual Input and Output Channels determines the exact number of channels that will be available at both inputs and outputs of each software. Thus, this is the most important setting to do before everything else, since it is not a dynamic process. So if you need to make any changes, the jack studio setup will have to be reconfigured. The Following example has a 44 channels setup:

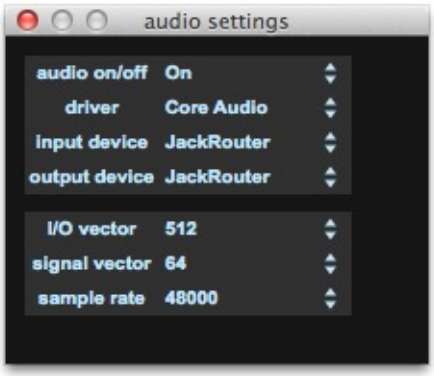


3.1.2. Start Jack

3.2 Start Spatialization Server

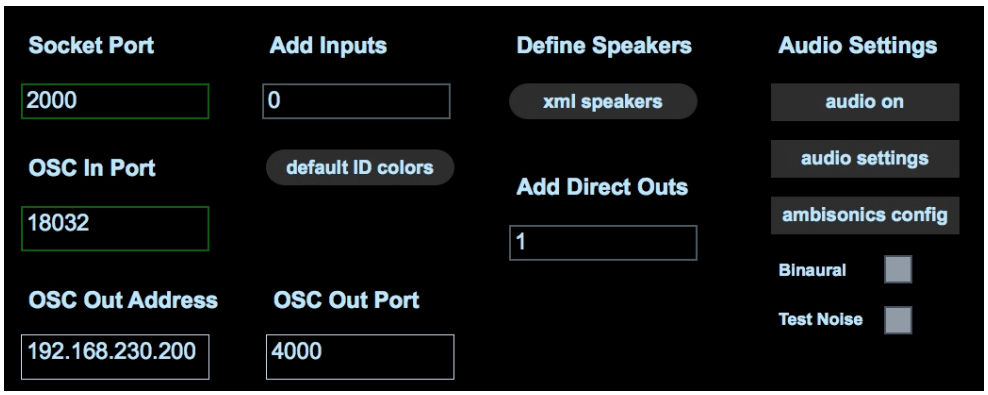
3.2.1. Audio Settings

Open the Audio Settings and set inputs and outputs to JackRouter:



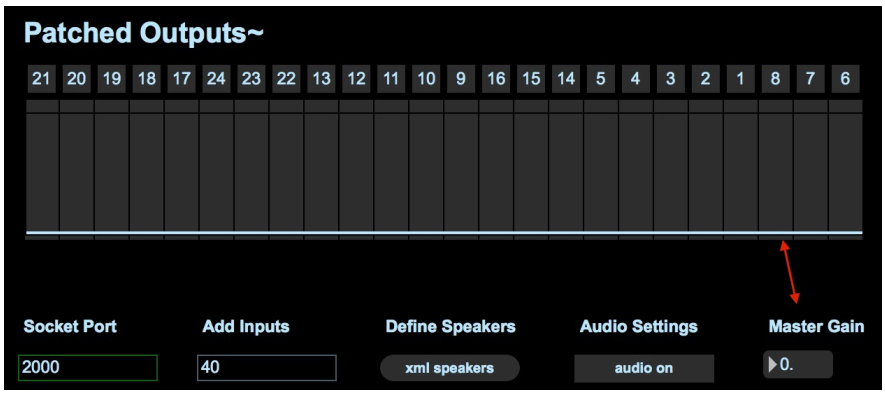
3.2.2. Open Server file

Open the Server file you saved. It should contain not only the Inputs~ but the Speakers Setup as well, but not always. If not, just click on the xml speakers and choose your preferred speakers setup:



3.2.3. Adjust the output level

By default, the output level of the Zirkonium is set to -∞ (0 in the Master Gain box). A value of 1 is the unity gain. A white line that crosses all the outputs' meters represents the volume:

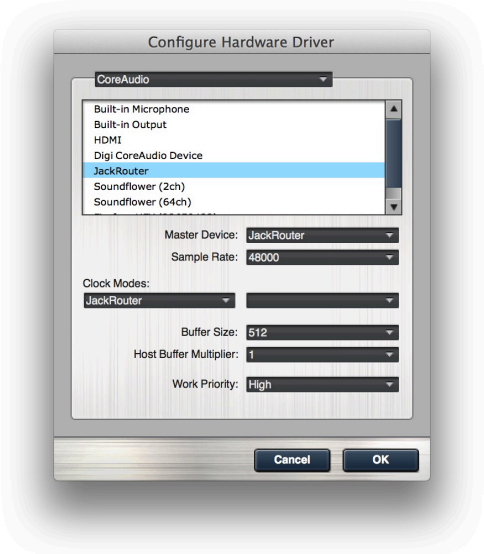


3.3. Open your DAW

The DAW should contain as many tracks as you intended to use in the project. It is preferable to create as many tracks as you can imagine may be necessary for your project at the beginning of it. Since Jack is not able to make any changes dynamically, if you need an extra track and you add it after the configuration is made, the whole setup will stop to work! So, just create a project that will contain enough tracks, even if you don't use them (simply put the same number of tracks than the virtual inputs of Jack). You'll be able to add audio in these tracks all along the process without having to deal with an interruption.

3.3.1. Assign your DAW to Jack

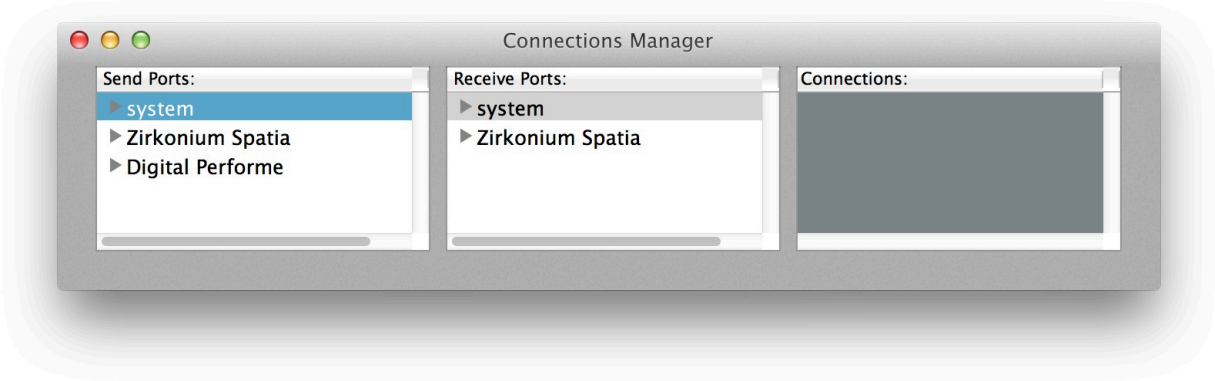
In the audio setup of you DAW, assign the outputs to JackRouter (here's an example in DP):



3.4. Organise the communication in Jack

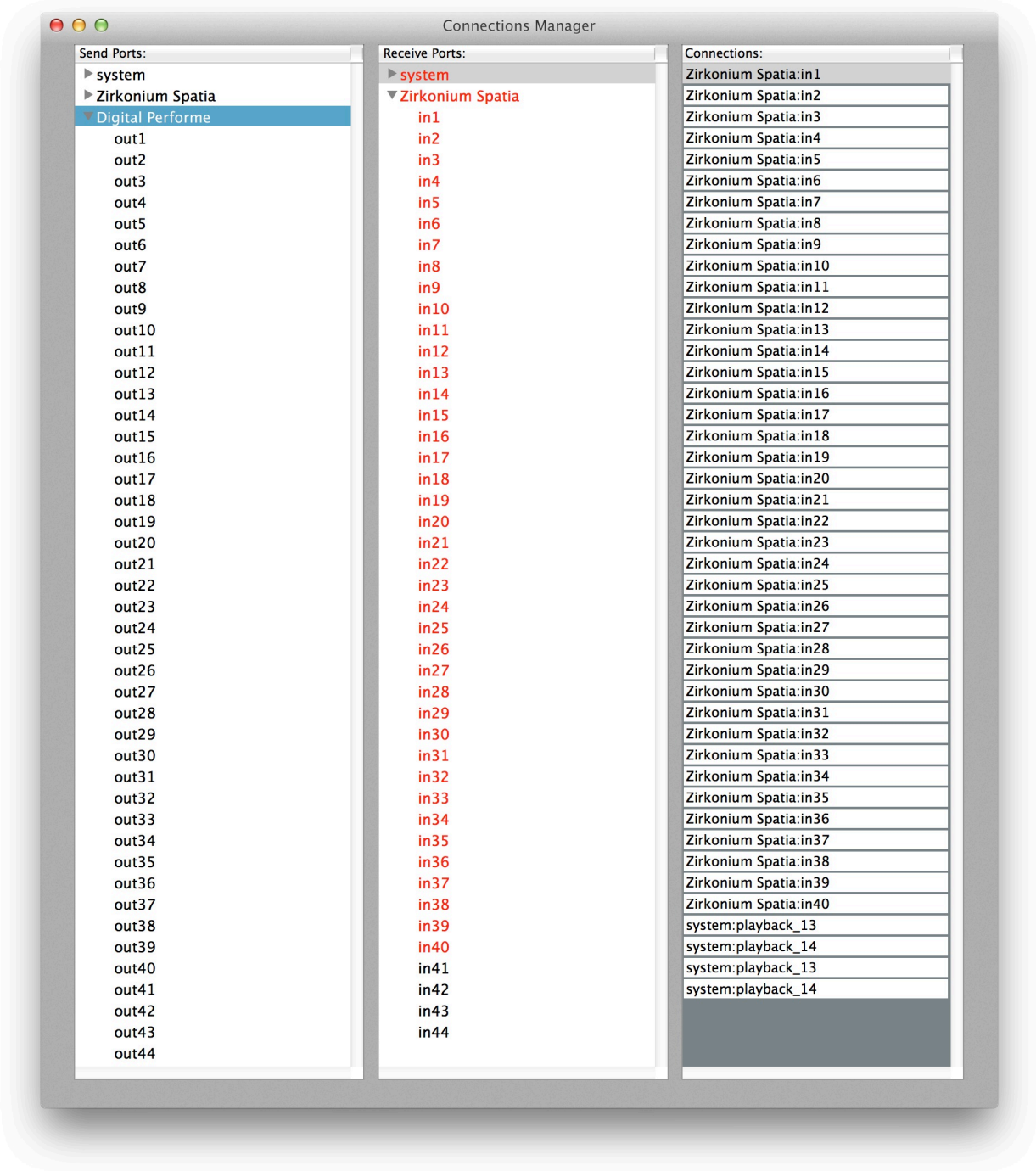
3.4.1. Routing

Open the Routing window. This is where each piece of software and hardware assigned to Jack are recognized. It is essentially a matrix with the Send Ports on the left and the Received Ports on the right:



3.4.2. Outputs of the DAW

The system is the audio interface itself and one can see the DAW (DP here) and the Zirkonium. This is where you make the connections. The sends of the DAW (its outputs) are sent to the Zirkonium receive Ports (its Inputs) and the Zirkonium Send Ports (its outputs) are send to the system (audio interface), where the speakers are connected (number in red means they are connected):

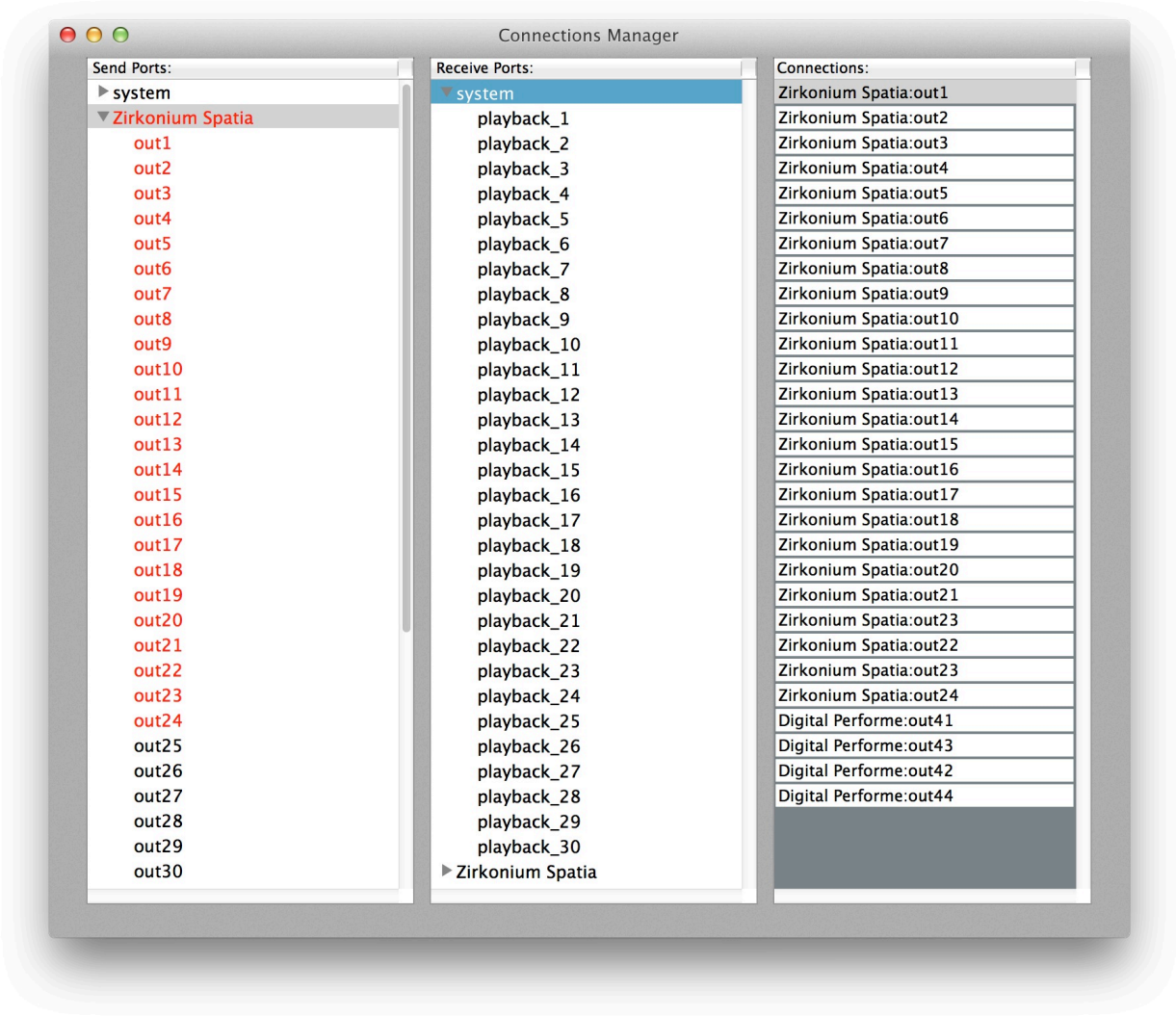


One can see here that only 40 out of the 44 outputs of the DAW are connected

to the Zirkonium. The extra four outputs are connected directly to the system (system 13 and 14 here), to subwoofers speakers that are not spatialized by the Zirkonium.

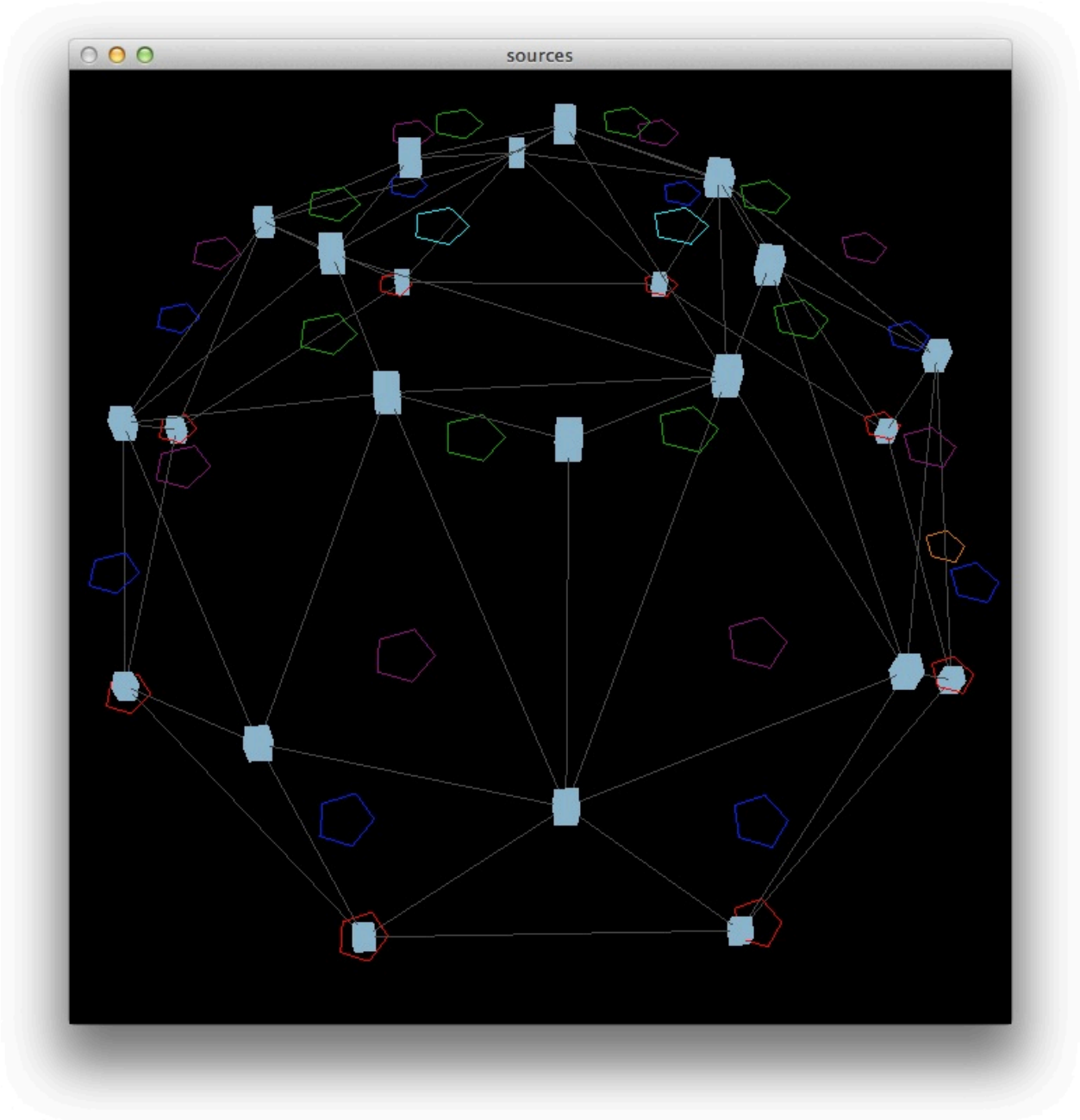
3.4.3. Outputs of the Zirkonium

Every output of the Zirkonium is associated with an output of the system, which means to a loudspeaker (here an example with 24 speakers):



3.4.4. 3D Representation

This is what it looks like with 4 ZirkOSC2 with octophonic track each plus a stereo track viewed on a 24 speakers dome:

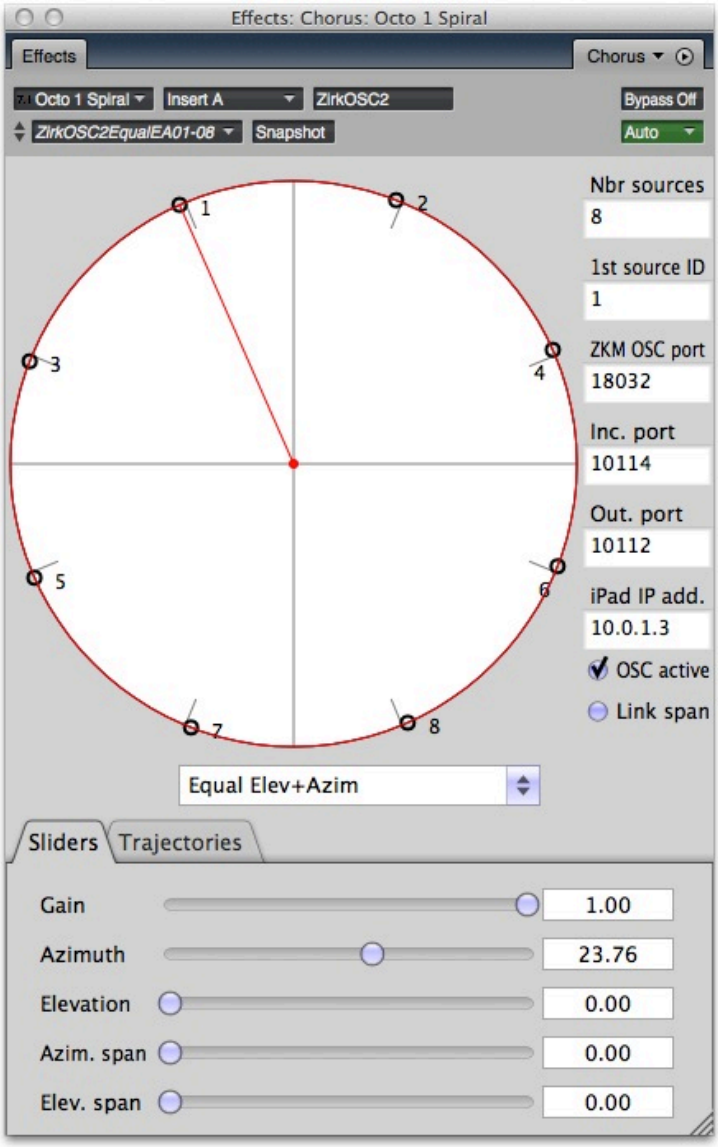


4. ZirkOSC2

The ZirkOSC2 is a plugin (AU and VST formats) designed to control the Zirkonium MKII from any compatible audio sequencer on a Mac. It allows the user to spatialize the sound in 3D under a dome of speakers. As its name implies, it sends Open Sound Control (OSC) data to the Zirkonium. The ZirkOSC2 is not an audio plugin, it only sends and receives data between two applications. The audio itself is sent from the DAW to the Zirkonium though Jack.

4.1. Parameters

The Sliders window consists of the settings of the main parameters:

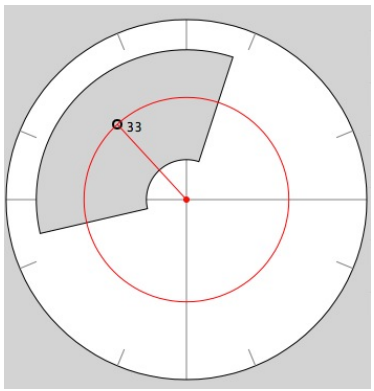


— Nbr sources: the number of audio channels included in the tracks (up to 8)
— 1st source ID: every channel should have a unique ID number to get an independent trajectory

— ZKM OSC port: the OSC communication port between ZirkOSC2 and the Zirkonium MKII: they should be set accordingly
— Inc port: incoming data from an iPad using TouchOSC
— Out. port: outcoming data to an iPad using TouchOSC
— iPad IP add: IP address of the iPad
— OSC active: checked or not
— Link span: all the sources are linked when the span parameter is changed
— Sources movements (drop down menu): how the sources are linked together:

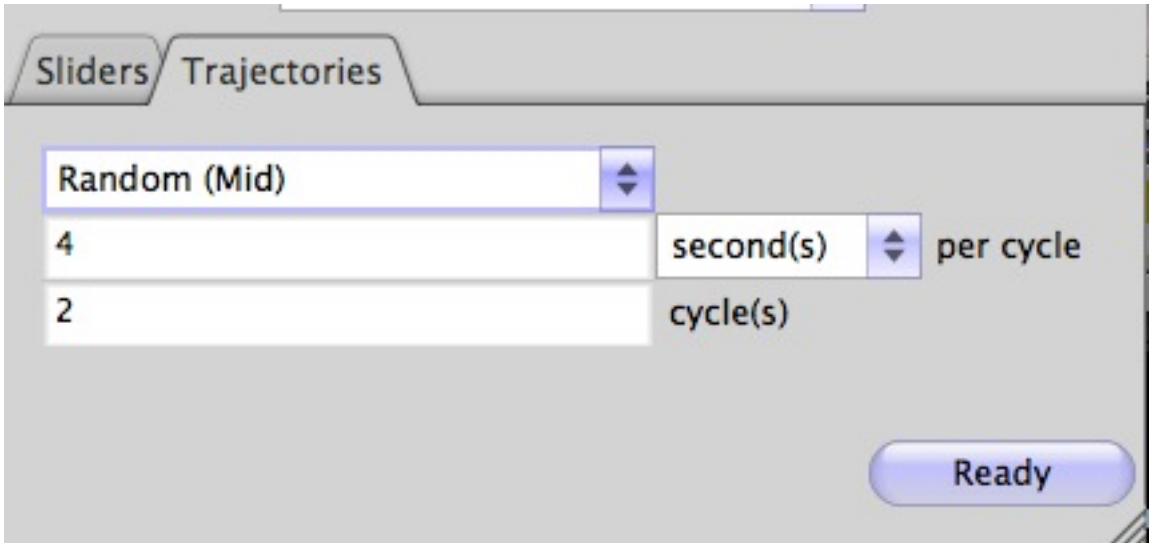
4.2. Sliders

— Gain: a general gain control
— The Azimuth and Elevation sliders allow setting these parameters in a different way than using the mouse directly by moving a source in the main window
— Azim. and Elev. Span: the Span is a 3D extended version of the pan in stereo: it allows to spread the signal to many speakers, or even to the whole dome, horizontally and/or vertically:

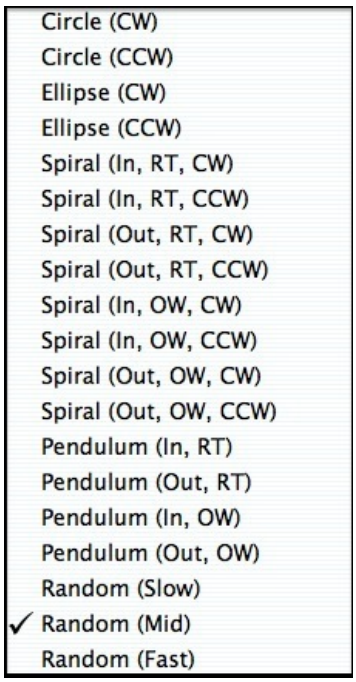


4.3. Trajectories

The trajectories are automated functions that draw patterns according to different figures, duration (in seconds or in beats according to the DAW MIDI tempo) and cycles:



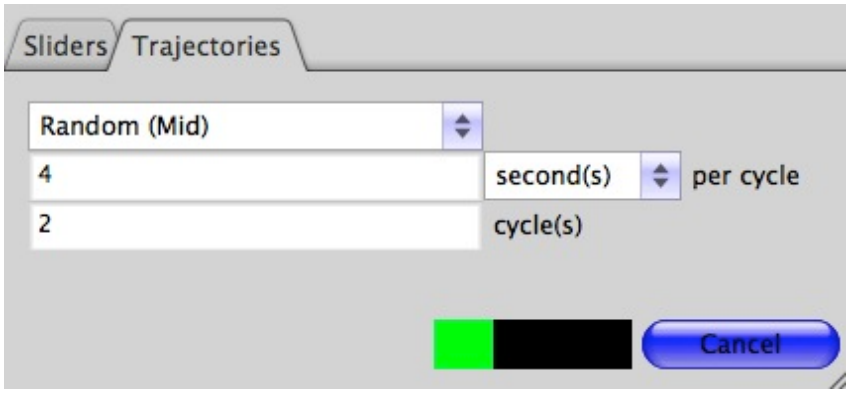
The different figures are:



CW: ClockWise
CCW: CounterClockWise
RT: ReTurn
OW: One Way

4.4. Automation recording

The Ready button makes the trajectory ready to play. According to the DAW, the trajectories can be previewed or recorded. The button changes to Cancel when you click on it. This is the way you cancel the preview. If you have a trajectory of one minute, you don't have to play it up to the end. You can cancel it at any moment:



There is also a small window that shows the progression of the trajectory over time.

Have fun!