LESON

INSIDE THE SOUND

# DeepStereo Reverb

## DeepStereo Reverb Lite

3D Audio Reverberator

**VST3 - AU - AAX Plugin**

**macOS – Windows**

music UNIT

# Concept

**DeepStereo Reverb** is a 3D reverb built for modern audio production – from traditional stereo mixing to full binaural context. It enables the creation of coherent, enveloping spaces that can be precisely positioned in the 3D field, while maintaining the musicality and control required by professional workflows.
Designed for both music production and immersive post-production, DeepStereo Reverb integrates seamlessly into modern spatial audio workflows.


## Why DeepStereo Reverb?

In modern production workflows, reverb must do more than simulate a room. It must behave as a spatial element that can be shaped, positioned, and controlled with precision inside the mix.

DeepStereo Reverb bridges the gap between traditional stereo reverbs and multichannel reverberation, giving creators full control over the geometry, depth, and spatial placement of their reverb field in the 3D space.

## Next-generation 3D audio reverb

DeepStereo Reverb is not just another reverb plugin – it's a new approach to space design.
It is built to meet the real needs of audio professionals who require:

- Reverb that behaves as a true spatial element inside the mix
- Precise control over the position and geometry of the reverberant field
- A creative tool designed for both stereo and binaural production workflows

# Key features

### Designed for modern workflows

DeepStereo Reverb fits seamlessly into contemporary production environments, from classic stereo sessions to advanced binaural mixing. It brings spatial depth, realism, and creative flexibility to any mix, from subtle ambience to fully enveloping spaces.

### Precise spatial positioning

Unlike traditional reverbs that remain fixed in stereo, DeepStereo Reverb allows full spatial placement of the reverb field:

**Azim** (short for azimuth) - Positions the reverberation around the listener in the horizontal plane
**Elev** (short for elevation) - Positions the reverberation around the listener in the vertical plane
**Width** - Controls the spatial spread of the reverberant field

### Sphere & Contour

DeepStereo Reverb introduces dedicated spatial controls that define how the reverberant field expands and wraps around the listener, enabling both natural and creative spatial diffusion in 3D audio space.

### Native binaural engine without coloration

DeepStereo Reverb's binaural engine is based on a patented “universal HRTF” technology delivering consistent binaural rendering to all listeners without requiring individualized calibration. This approach ensures reliable spatial perception. Platform-independent by design, DeepStereo Reverb operates with any standard stereo headphones and loudspeakers.
Together, these controls transform reverb into a fully positionable spatial element inside stereo and binaural mixes.

### Classic (and less classic) reverb settings

**Size** - Adjusts the perceived scale of the virtual space, ranging from intimate rooms to vast environments.
**Decay** - Controls the duration of the reverb tail, ranging from dry ambiences to extensive cinematic spaces.
**Style** - Shapes the overall character of the reverb to suit the source and the mix, transitioning smoothly from a warm, elegant vintage sound to a more modern, clean, and transparent aesthetic.

# Detailed Features I

## Size & Decay

The Size parameter simultaneously controls the various temporal components of the reverberation field: the different types of early reflections, clusters, and the diffuse field.

For algorithmic reasons as well, the Decay parameter (reverb tail duration) depends on the Size setting. By setting either of these two parameters to its shortest value, you can easily recreate environments that simulate particularly confined acoustic spaces. Conversely, with the highest settings, you can create the impression of particularly vast acoustic spaces.

Due to the unique nature of the technology specifically designed for 3D immersion, size and scale are not expressed in actual physical units, but rather on a standardized scale ranging from 0 to 100.

*Note: Since processing takes place in real time, you may hear unwanted audio artifacts when adjusting the Size parameter.*

## Style

This setting controls numerous internal parameters. The original design aimed to smoothly transition between two well-known (and nearly opposite) reverb styles:
- "Vintage" (value set to -50): an "old-school" effect reminiscent of a plate reverb – diffuse, subdued early reflections with a rather dark tail.
- "Modern" (value set to +50): an engine that's generally considered precise and modern, with a potentially more acoustic character – sharper, more defined early reflections, and a brighter, more transparent tail.
The practical aspect of this Style control is that it allows you to continuously adjust between all possible settings, while staying focused on what matters most and without ever wasting time.

## Predelay

Determines the delay between the input signal and the start of the reverb. This parameter is expressed in milliseconds (ms).

## Mod

This switch allows you to enable or disable the modulation effect on the reverb signal.
Modulation is not a fixed effect because it is linked to the Style knob in a nonlinear way. When active, the modulation is quite pronounced when the knob is set to the Vintage side; it remains present but is slightly muted when the knob is at 0 (exactly between Vintage and Modern); and it becomes very subtle as you approach the Modern end of the knob's range.
This modulation effect was designed to add a slightly "smoother/velvety" quality to the reverb. However, with certain sensitive harmonic sources and in certain contexts (e.g. in classical music), disabling this modulation may yield better results in terms of tonal accuracy.

# Detailed Features II

## Sphere

Each Sphere setting corresponds to a specific arrangement of the various reverb channels in 3D space.

As shown on the visualization screen (see next page), each of the four Spheres is organized differently in space:

- Sphere I: The reverberant field comes mainly from a single direction
- Sphere II: The reverberant field begins to widen
- Sphere III: The reverberant field surrounds the listener
- Sphere IIII: The reverberant field fills the entire 3D sound space

By default, this setting offers four completely different 3D immersion options. You can then completely reconfigure the spatial output using the three orientation controls on the right side of the screen: Azim; Elev; Width (see next page).

The spatial and temporal distribution of all reverb channels also differs for each of the four Spheres. This results in a variety of tones and textures for the reverb field, which, when combined with the directional controls, open up a whole new range of sonic possibilities.

## Contour

Like the other plug-ins in the DeepStereo range, Contour relies on several spatialization algorithms, specifically designed and combined here for DeepStereo Reverb.

Note regarding the signal flow:

- Contour is applied after the Sphere setting
- Contour is not affected by orientation settings

Several subjective criteria can help guide you in choosing this setting:

- The width of the effect
- The intensity of the 3D immersion
- The density of the reverberation field
- The overall listening comfort of the effect

*Note: Interaction between certain parameters*
*Due to the reverberator's internal architecture, which enables 3D spatialization, the Size, Style, and Sphere parameters are partially interdependent. As a result, the possibilities for sound design, textures, and immersive experiences are virtually endless.*

## Download, installation & activation

DeepStereo Reverb is available for download from this web page:

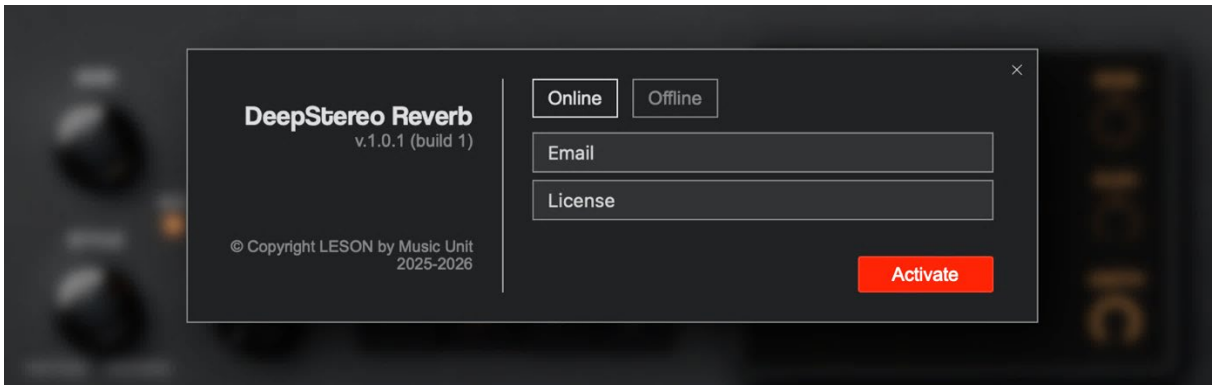
https://store.musicunit.fr/get/dsr/

Select your platform – macOS or Windows – and download the corresponding installer.

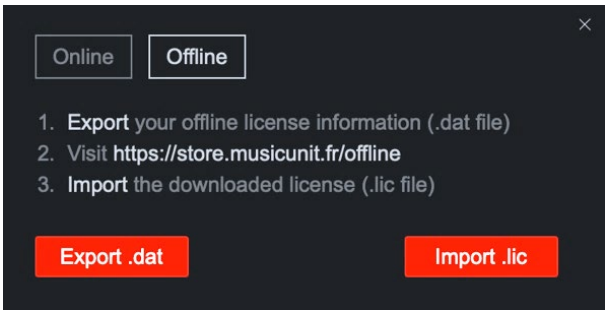
Double-click the installer icon and follow the instructions.

Launch your preferred DAW and insert the DeepStereo Reverb plugin on an audio track in the desired format – VST3, AAX, or AU – depending on your OS and DAW.

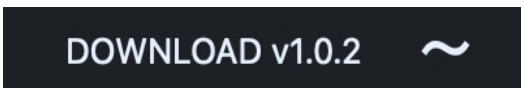
In the plugin interface, click "ACTIVATE" next to the tilde icon in the upper-right corner, then enter your email address and the license key you received by email when you made your purchase.




You can also activate the service offline by clicking the "Offline" button and following these instructions:

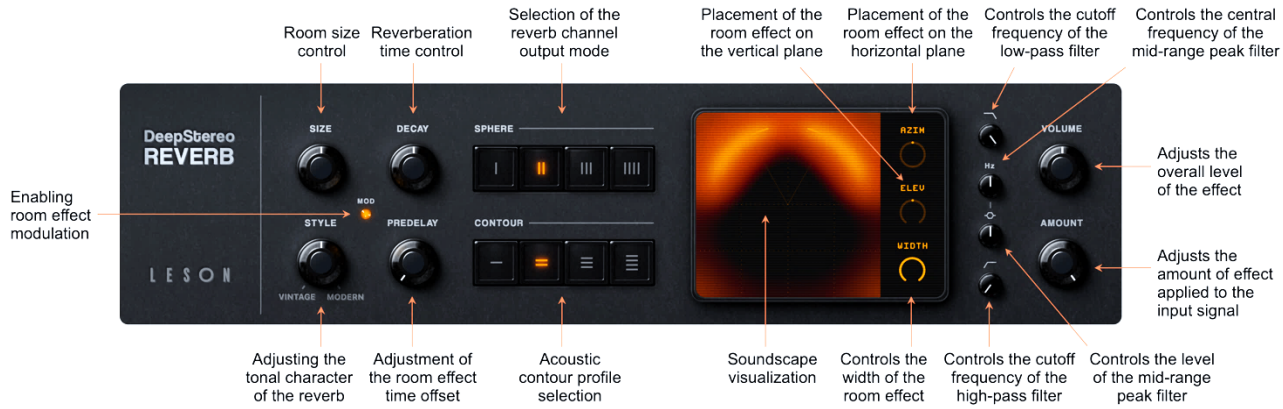



If you see the "Download vX.X.X" message appear in the toolbar, it means a newer version of the plugin is available. Click the message to open your web browser and follow the instructions to download the new version.



# User interface

The DeepStereo Reverb plugin interface is structured into distinct sections. The central screen displays the sound space and includes controls for adjusting the spatial distribution of the reverberation.




The Sphere and Contour settings affect the spatial distribution of the reverb, and their effect is immediately visible in the central display.

Surrounding the central screen and the Sphere and Contour controls are the more traditional reverb settings, such as the time and timbre controls for the room effect.

### Dynamic GUI scaling

You can resize the interface by clicking and dragging the lower-right corner of the window.

# Presets

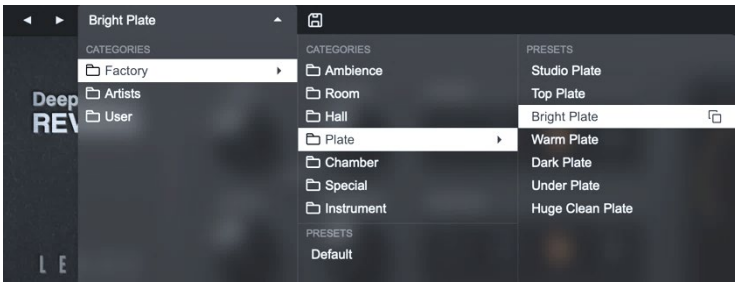
DeepStereo Reverb features a simple tool for browsing a collection of factory presets and presets generously provided by partner artists and producers, as well as for saving and recalling custom settings. The Factory presets include familiar categories: Ambience, Room, Hall, Plate, Chamber, Special and Instrument. The Artists presets are based on actual mixing sessions.

Given the technologies built into DeepStereo Reverb, some of these presets may surprise you with their originality. For creative purposes, some presets were directly adapted to different locations in 3D space and identified using various suffixes (or, in a few cases, prefixes): front, rear, side, corner, top, bottom, etc.

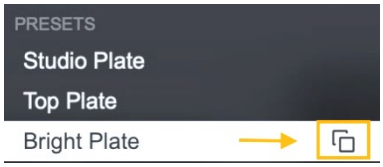
*Important:*
Please note that the current values for the Volume and Amount controls are preserved when a Factory or Artists preset is loaded. Therefore, whether you use DeepStereo Reverb as an insert or on an auxiliary return, you can listen to the presets by switching between them without changing your Volume and Amount settings. This mechanism does not apply to User presets, for which all settings are restored.

## Preset editor

Click the "◀" and "▶" arrows on the left side of the preset bar above the interface to scroll through all available presets.
Click the drop-down menu containing the name of the current preset to open the preset browser. Browse the collection freely and click the preset of your choice to load its settings.

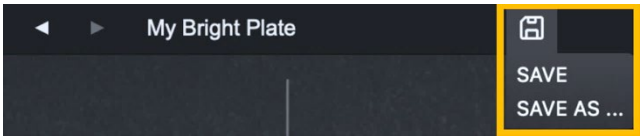



You can create your own version of a factory or artist preset at any time while navigating by clicking the icon to the right of the selected preset's name.
You will then be prompted to rename the preset as you wish.
The preset will be saved in the User section.



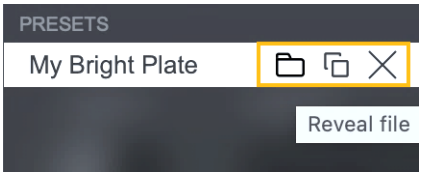



You can save changes to the selected preset's settings and/or create your own user presets at any time during a settings session by clicking the floppy disk icon in the preset bar.




When you select a User preset, you can:

- Locate the file containing the preset – e.g. for sharing purposes – by clicking the folder icon. You can also add a preset to the User collection by dragging and dropping a preset file directly onto the interface.
- Duplicate the preset by clicking the file icon.
- Delete the preset by clicking the X icon.

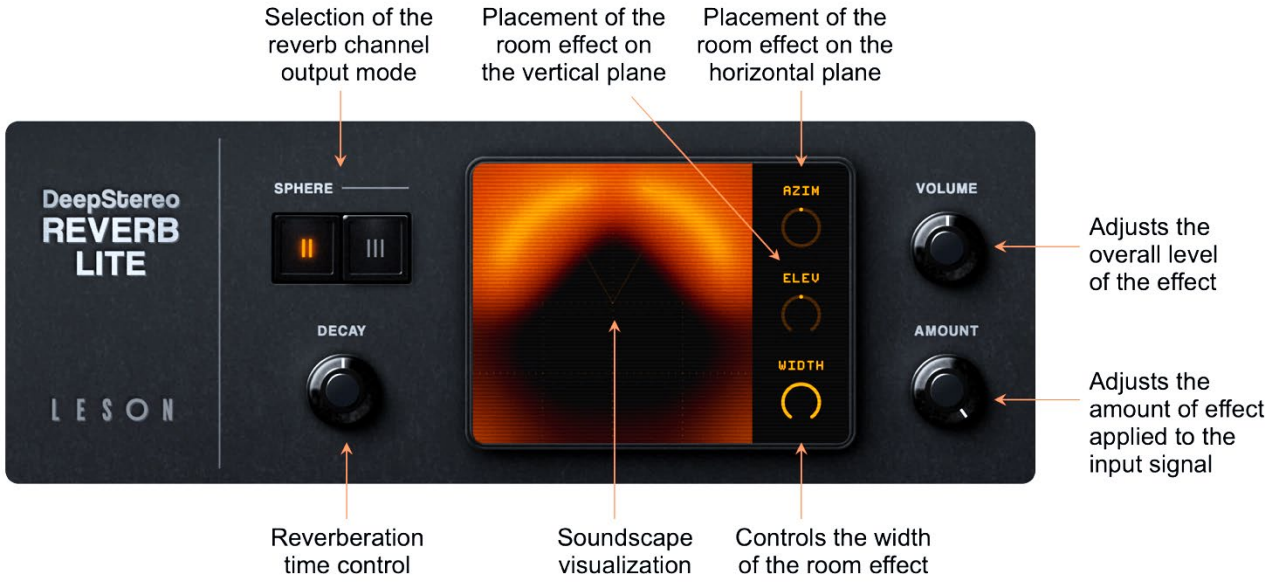



*Note I: When the drop-down menu is open, a single click loads the preset without closing the menu - allowing you to browse the list and quickly select another preset. Then click elsewhere in the user interface to close the list. However, if you know exactly which preset you want to select, you can double-click it: the list will close immediately once the preset is loaded.*

*Note II: User preset files and folders can be organized as desired in the Finder (macOS) / File Explorer (Windows) into a custom folder structure. Simply close and then reopen the plugin interface to view the new folder and file hierarchy.*

# DeepStereo Reverb Lite

DeepStereo Reverb Lite is the streamlined version of DeepStereo Reverb. It offers simplified control over the same immersive reverb model used by DeepStereo Reverb.




DeepStereo Reverb settings that are not available in the DeepStereo Reverb Lite interface are set to default values:

- Size is set to 50
- Style is set to 0 – halfway between “Vintage” and “Modern”
- Predelay is set to 0 milliseconds
- Modulation is always active and set to a midpoint value

Note: Decay has the full DeepStereo Reverb range, from 0 to 100 – but is limited to a fixed Size value of 50, as the two settings are linked.

All of the activation features and the preset editor work the same way as they do in DeepStereo Reverb.

All of the factory presets available in DeepStereo Reverb Lite are also included in DeepStereo Reverb.

# Technical concepts

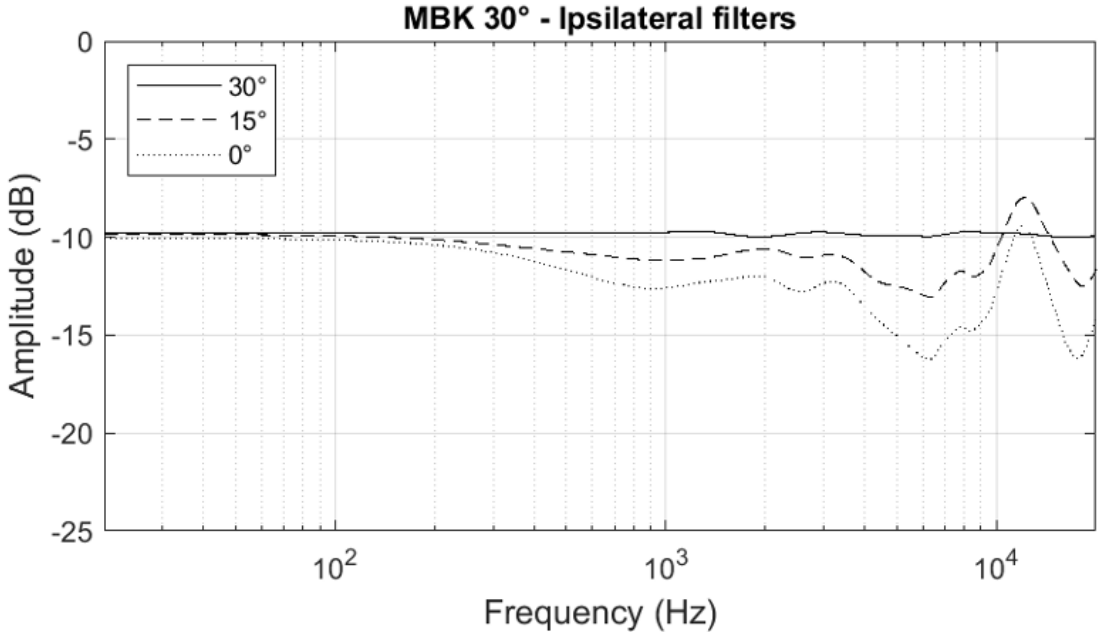
## About DeepStereo, innovative binaural technology

The DeepStereo Reverb plugin is based on an innovative binaural synthesis engine, designed with a simple perceptual goal in mind: when a listener hears a signal on speakers, then hears the same signal on headphones, they should feel like they are hearing the same sound content, with the same tonal balance and spatial intent. The listener does not explicitly perceive the absence of transfer functions related to their morphology, which are naturally involved when listening on speakers.

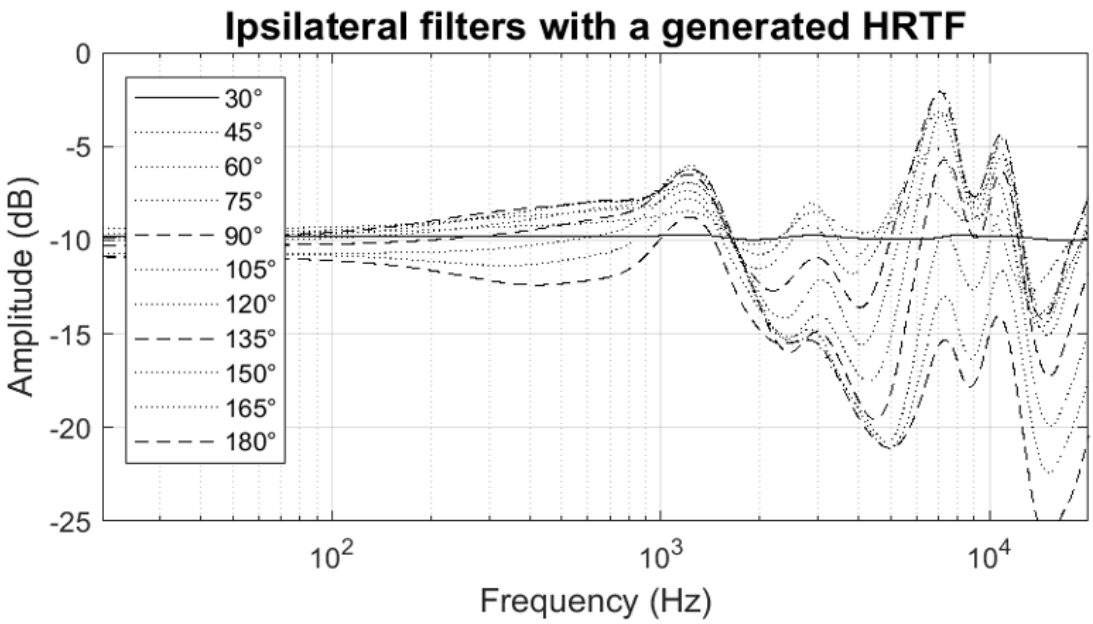
This observation highlights the ability of the human auditory system to naturally compensate for acoustic and morphological phenomena occurring between a sound source and the ear, and to maintain a consistent perception of sound content. The DeepStereo engine follows this logic: it aims to reproduce a perception equivalent to that obtained on speakers when using headphones, by attempting to eliminate natural psychoacoustic compensation while retaining all the spatial cues necessary for the localization and stability of the sound image.

## Universal transfer functions

The transfer functions used by the DeepStereo's binaural synthesis engine are derived from a set of measurements taken on around 100 subjects in an anechoic chamber. These measurements were averaged to obtain a statistically representative HRTF, then subjected to a perceptual normalization process. The fundamental principle of this normalization is to define a reference angle for which the frequency response of the ipsilateral signal – i.e., the signal received first by the ear closest to the source – is made as flat as possible. This reference angle usually corresponds to the front left and right speakers



This normalization is then consistently compensated for across all transfer function amplitudes – i.e., only frequency responses. Furthermore, the other spatialization indices – interaural time differences (ITD), level differences (ILD), and phase differences (IPD) – are fully preserved.




The result is a coherent, stable, and controllable binaural space based on the preservation of spatial relationships and cues, rather than on an exact reproduction of individual transfer functions, averaged or otherwise.

**Binaural rendering engine and management of interactions between sources**

The direct application of binaural transfer functions alone is not sufficient to guarantee perceptual neutrality. Indeed, while the filtering applied to the ipsilateral signal can be considered neutral for a given direction, the actual perception always results from the combination of the ipsilateral and contralateral signals.

The DeepStereo's binaural rendering engine therefore incorporates specific processing designed to compensate for the cumulative influence of contralateral filters, as well as interactions related to common content between sources.

This processing preserves tonal and spatial stability in complex mixing configurations, while maintaining the integrity of the binaural cues necessary for reliable spatial perception.

# About

## Leson by Music Unit

Leson is Music Unit's “haute couture” sound studio, dedicated to designing innovative audio solutions. Motivated by our long-standing partners - artists, sound engineers, and electronics manufacturers - who want us to translate our expertise into standalone tools that are accessible to everyone, we are developing a portfolio of patented inventions and high-end audio products for both content producers and broadcasters.

LESON

**Music Unit**

Music Unit is a French music and sound creation studio founded in 2004 that approaches the music and audio industry through creativity and musical innovation as well as technology.

Music Unit brings together artists, producers, and engineers who are masters of emerging audio technologies - spatial audio, AI, VR, AR - and want to share their knowledge and talents.
Our mission is to offer audiences the opportunity to enjoy new artistic experiences.

Contact: Music Unit 28 Rue Kléber 93100 Montreuil / France – support@musicunit.fr

## Credits

**Martin Antiphon:** DSP development, audio design
**Jérôme Boivin:** quality assurance, distribution
**Éric de Broche des Combes:** graphic design
**Alexandre Chaigne:** product manager, distribution
**Julien Chirol:** team manager
**Pierre Luzy:** audio design & fine-tuning, factory presets, user manual
**Manuel Poletti:** DSP development, audio & graphic design, user manual
**Kevin Schires**: DSP development, UI development, graphic design
**Team Leson**: product design

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