

HOLOPLOT

HOLOPLOT

Transforming Sound Experiences



CONFIDENTIAL



HOLOPLOT

Pro Audio technology
from Berlin

Established 2011

International Berlin / Las Vegas / Los Angeles

Experienced 140+ employees from 25 nations and growing

Award Winning



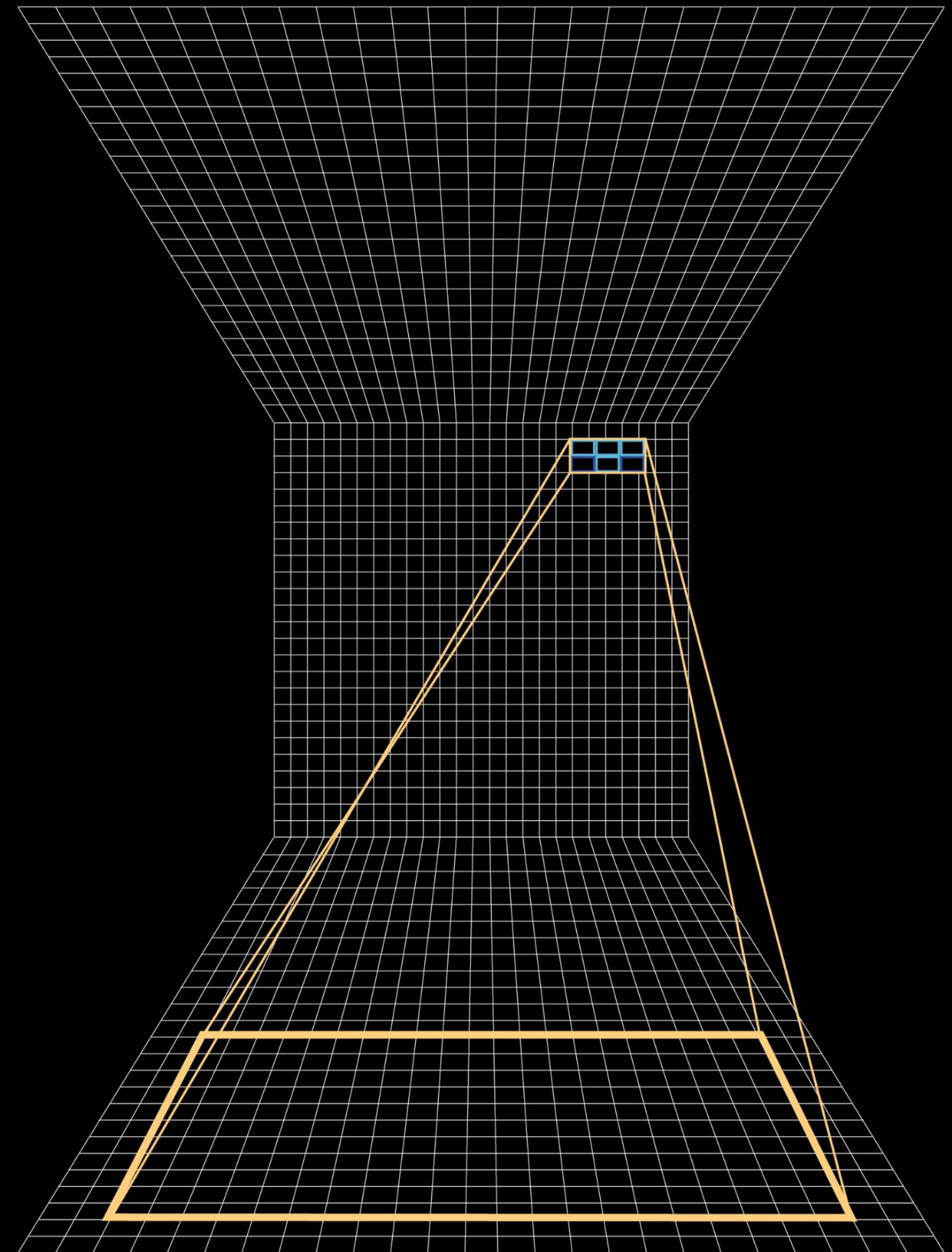
Our vision

A revolution in sound control

HOLOPLOT is the next-generation audio technology,
delivering a revolution in sound control.

Following a decade of pioneering research, HOLOPLOT is now the
global leader in Wave Field Synthesis and 3D Audio-Beamforming
technology.

From the world's largest immersive entertainment arena to the
everyday needs of rail commuters, our products transform
experiences and create unique memories of world-leading locations.

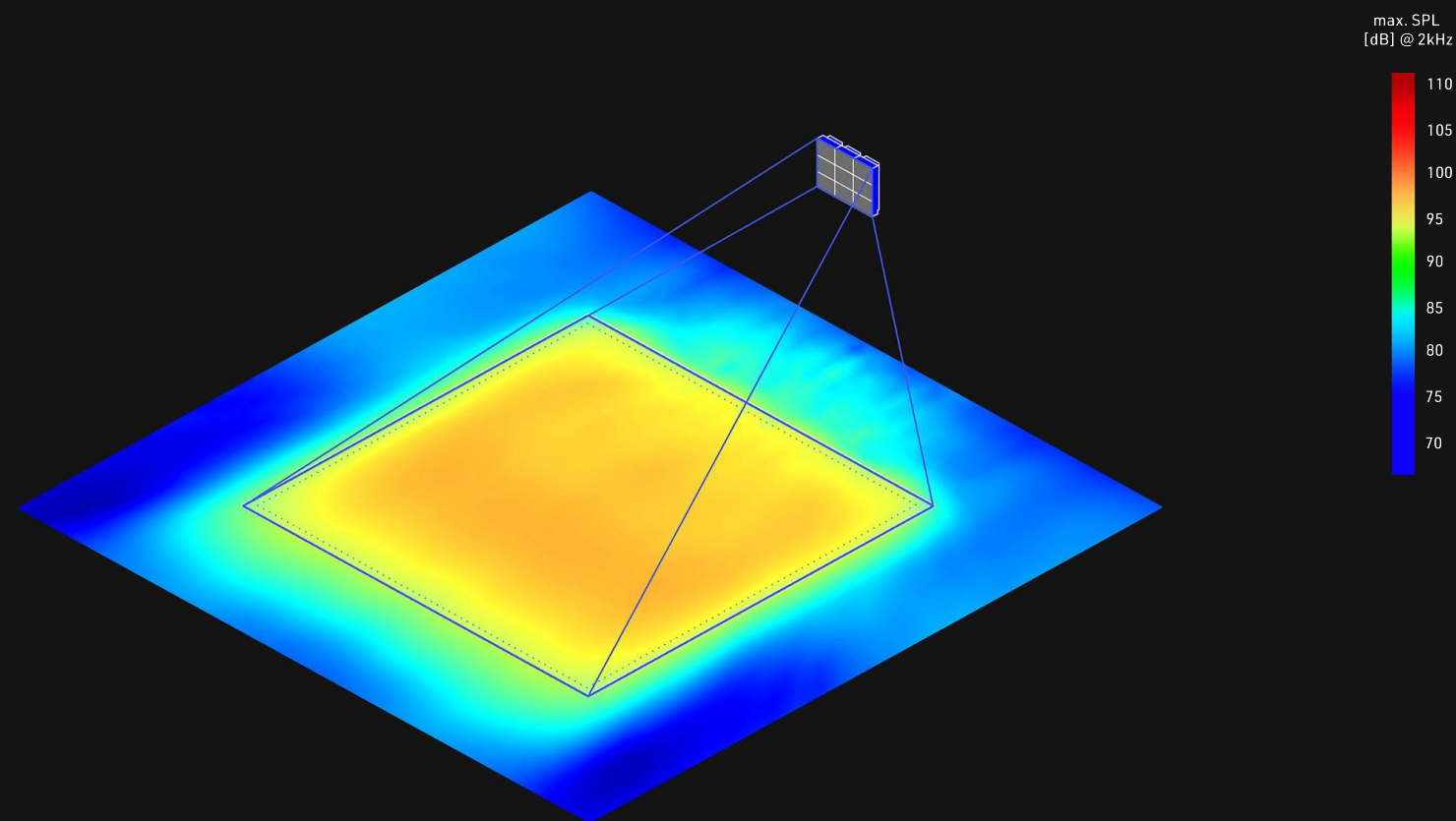
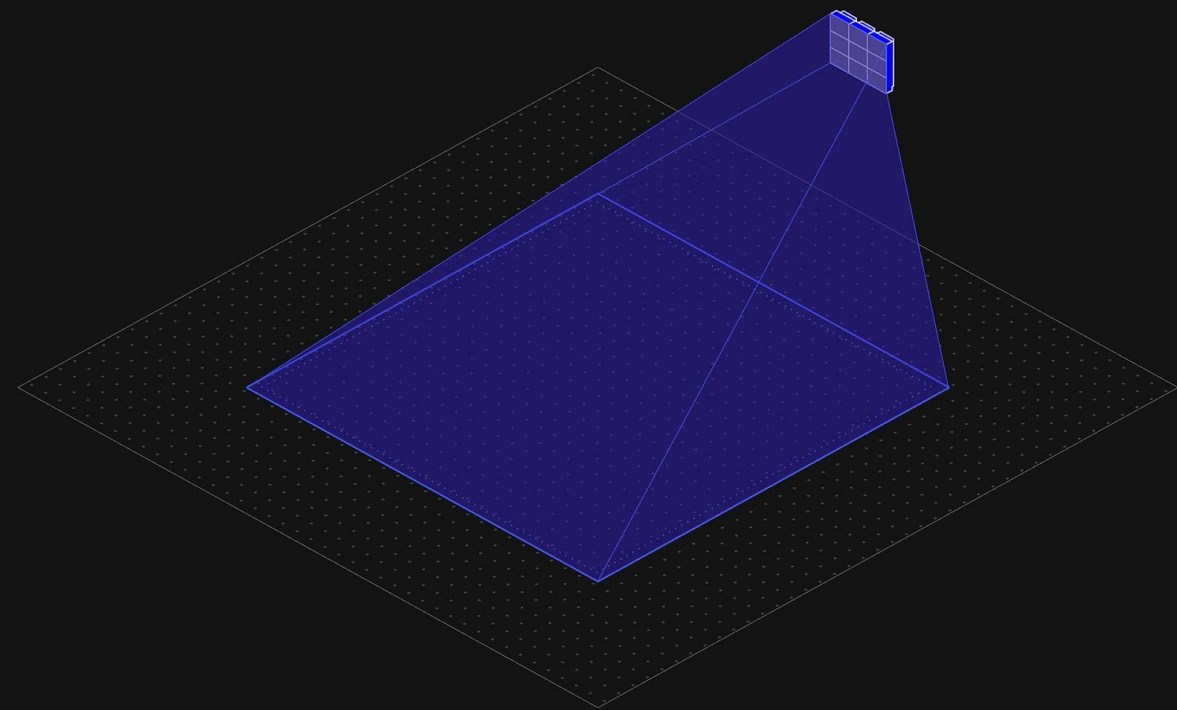


HOLOPLOT Technology

Audio in another dimension



Ultra precise
3D audio
beamforming



Coverage control

Homogenous sound fields

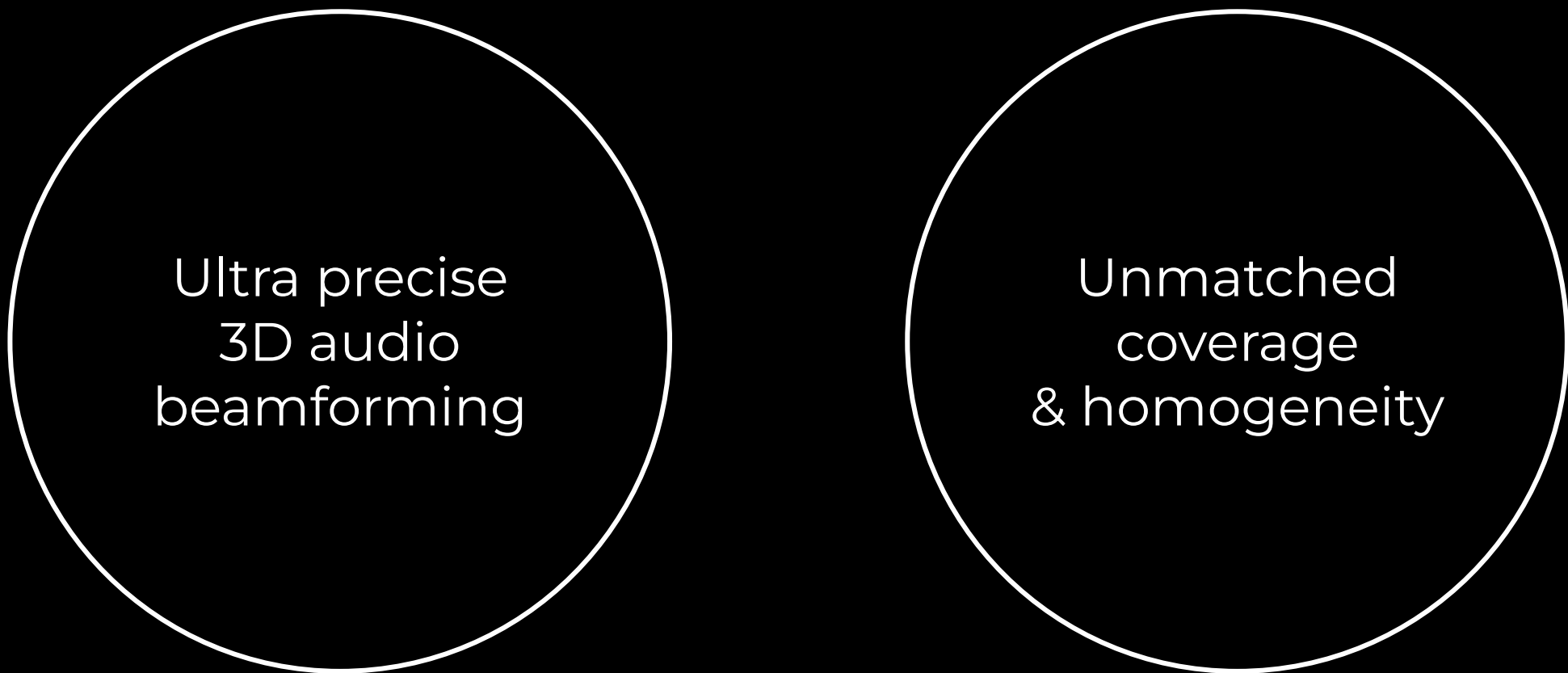
One of the biggest limitations of conventional loudspeaker technologies is the lack of control over the propagation of sound - leading to undirected sound fields, disturbing reflections and reverberation artefacts, and an often inconsistent sound experience across the audience area.

HOLOPLOT 3D Audio-Beamforming technology enables precise steering of sound, by providing directivity control in both the vertical and horizontal axis. This allows for the creation of sound fields that optimally cover audience areas of any shape and size.

The HOLOPLOT Beam Optimisation Algorithms ensure uniformity of coverage and spectral consistency across the whole audience area, making every seat the best seat.

HOLOPLOT Technology

Audio in another dimension



Ultra precise
3D audio
beamforming

Unmatched
coverage
& homogeneity

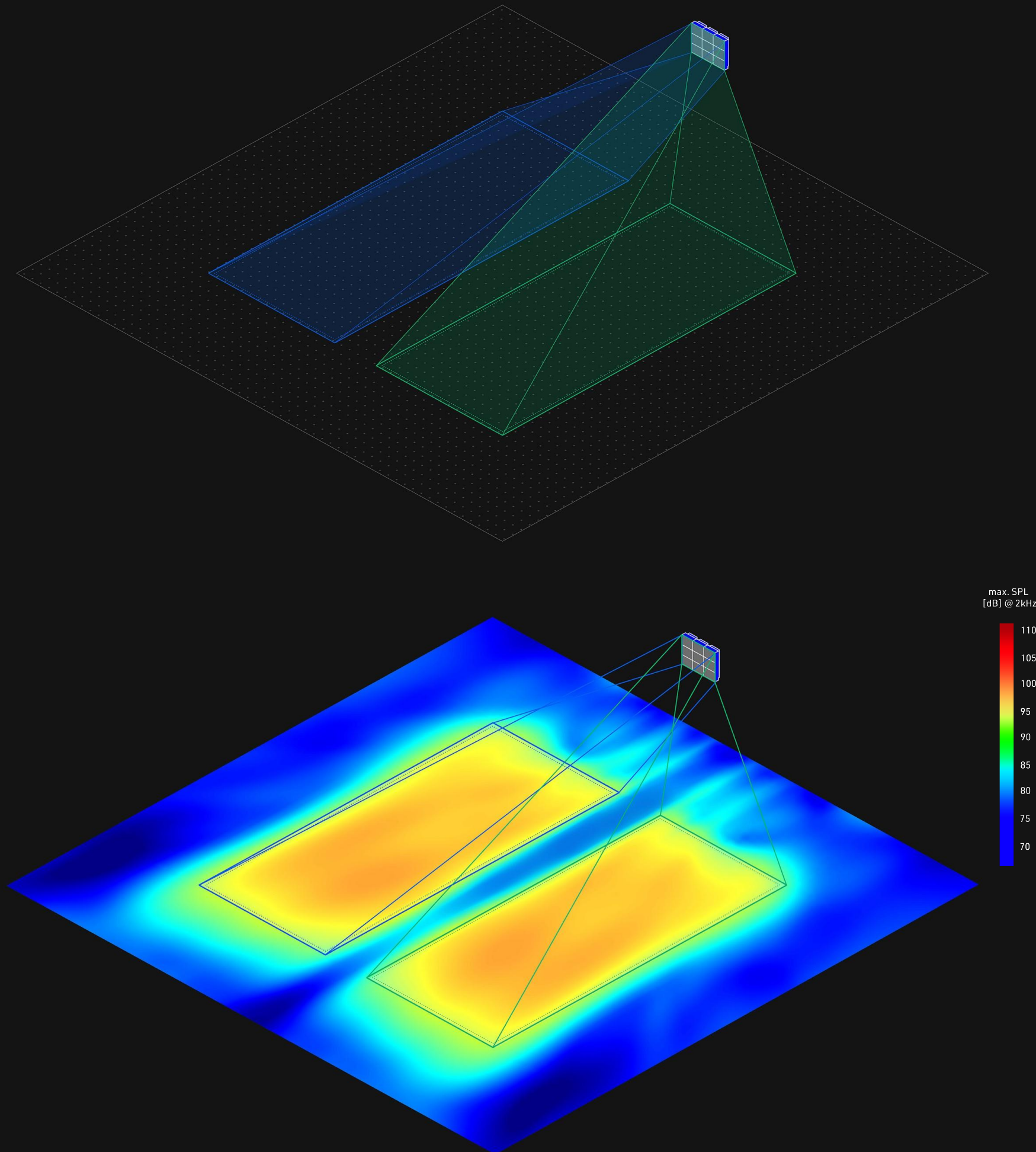
Multiple zones

Different content

A single HOLOPLOT Matrix Array can simultaneously produce multiple sound fields - each with its own content, equalisation, level, and shape.

This enables the creation of separate sound zones, effectively to target different areas in the venue with different content. HOLOPLOT 3D Audio-Beamforming technology optimizes the sound field's coverage homogeneity at each zone, and minimizes the sound spill between zones.

This unique feature can not only provide great value in functional applications but also unprecedented creative potential to utilise a space for multiple, different experiences simultaneously.



HOLOPLOT Technology

Audio in another dimension



Ultra precise
3D audio
beamforming

Unmatched
coverage
& homogeneity

Unique
immersive
capabilities

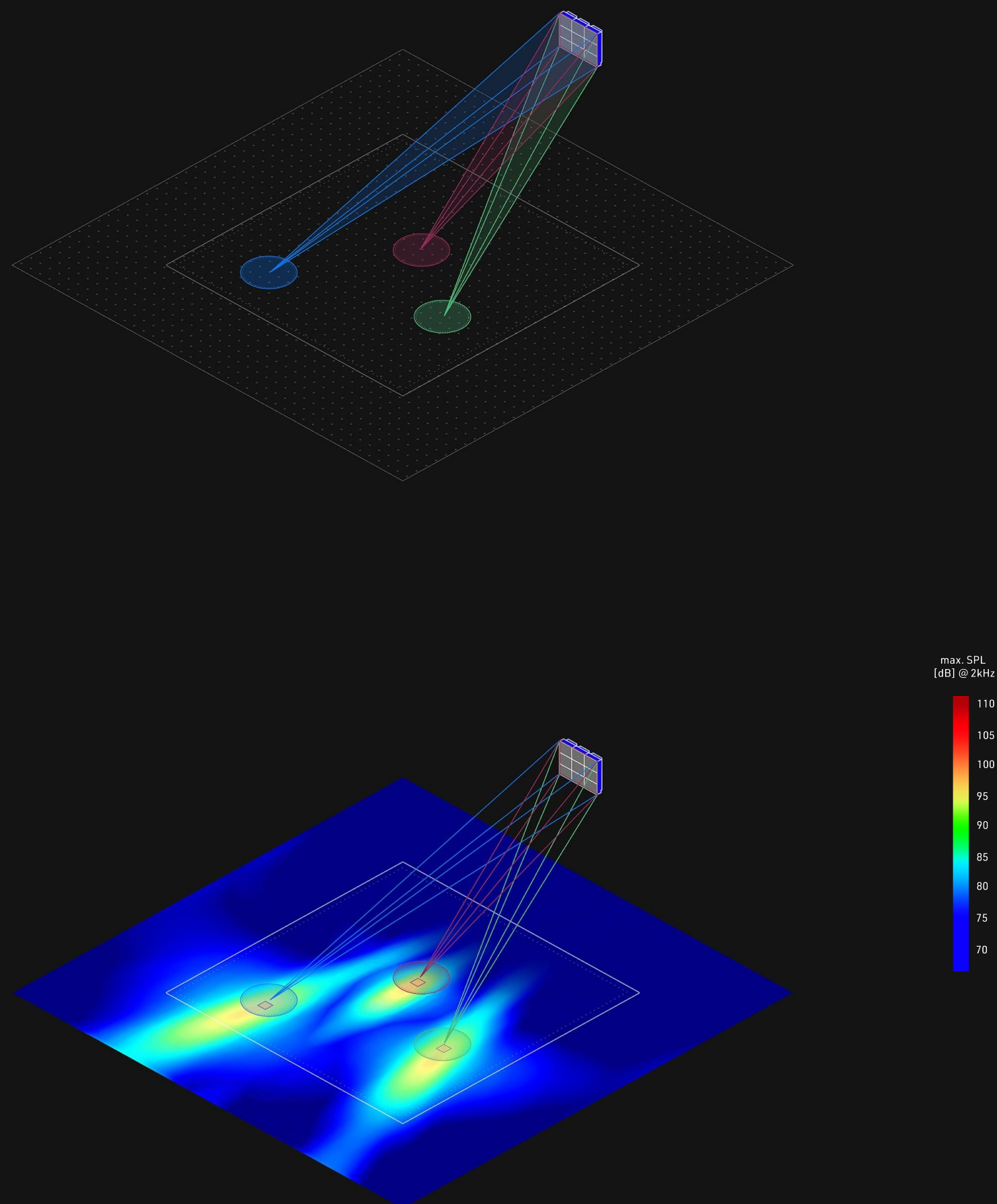
Focused content

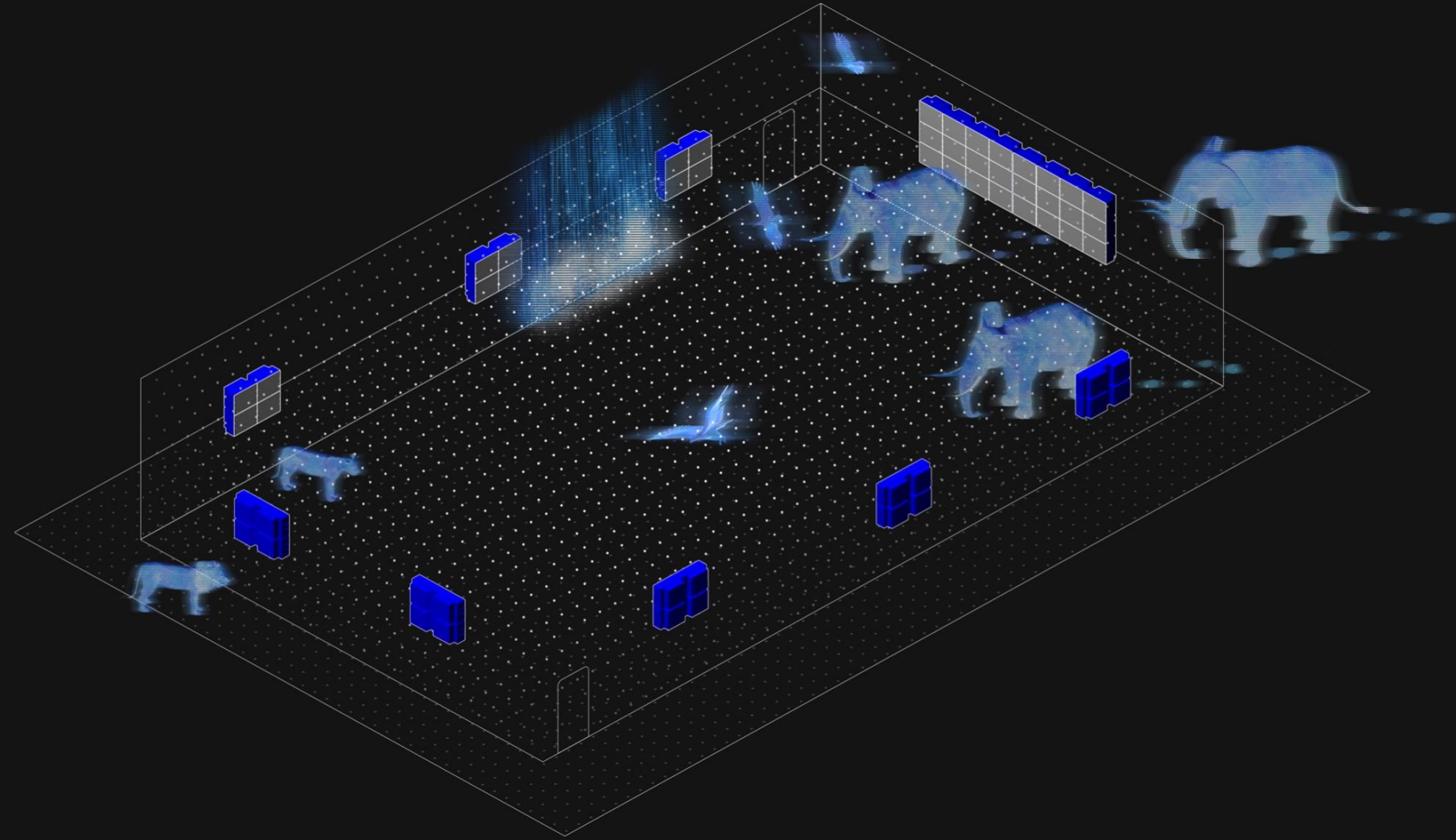
Target experiences

HOLOPLOT 3D Audio-Beamforming and Wave Field Synthesis give the capability to create complex immersive experiences.

Sound fields precisely targeted at specific locations in the venue deliver experiences to small groups of people or even individual members of an audience. What they hear will depend on where they are in the venue.

This provides a great auditory creative palette compared to traditional loudspeaker systems, enabling the design of soundscapes in which the listener can go on a journey and feel fully immersed.





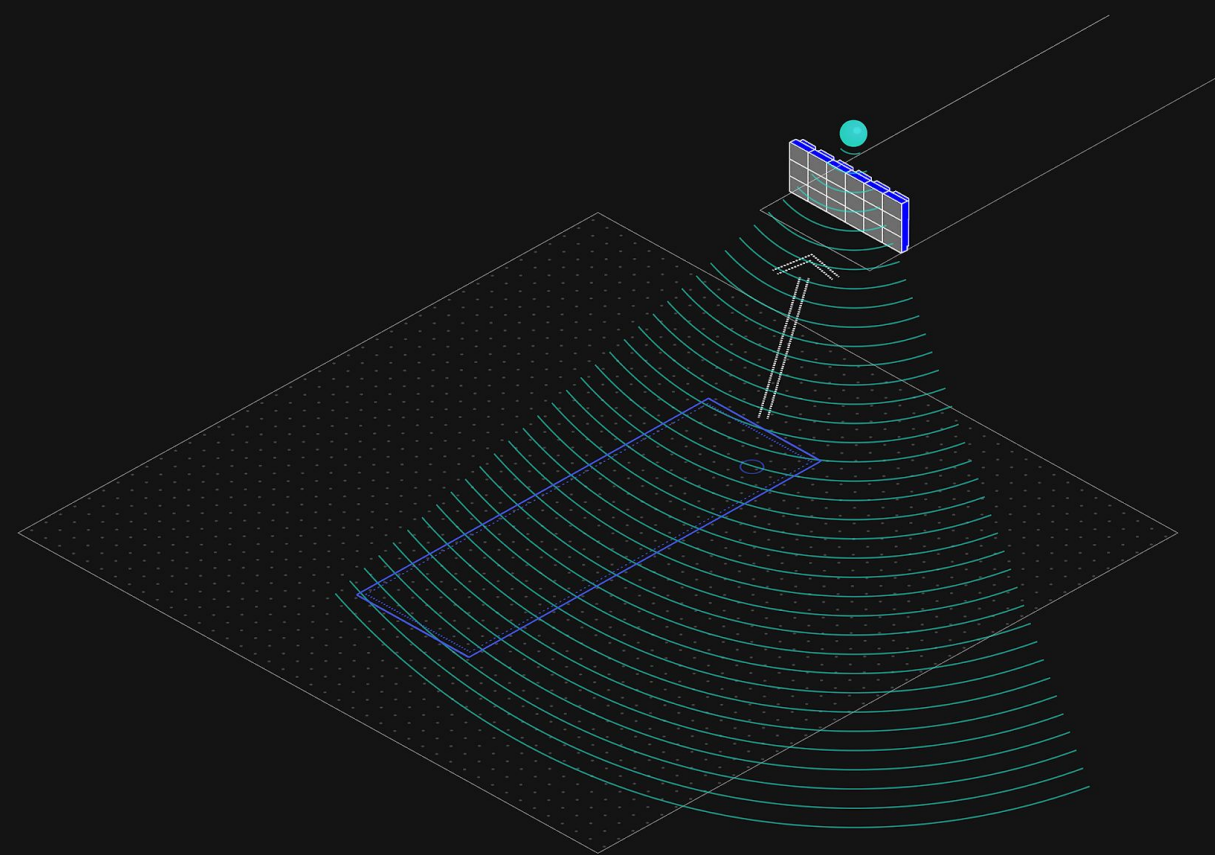
Immersive audio

Lifelike localization in three dimensions

With conventional audio technology, the perceived origin of sound is heavily influenced by the position of the loudspeakers, often leading to a mismatch between what you hear and what you see.

HOLOPLOT Wave Field Synthesis technology positions sound objects in the room with an authentic perception of location and direction for the listener. Every audience member will hear what they see, and see what they hear.

Create radically new auditory scenes with multiple distinct objects, some of them static and others moving dynamically in space - even into the audience area, close to the individual listener.



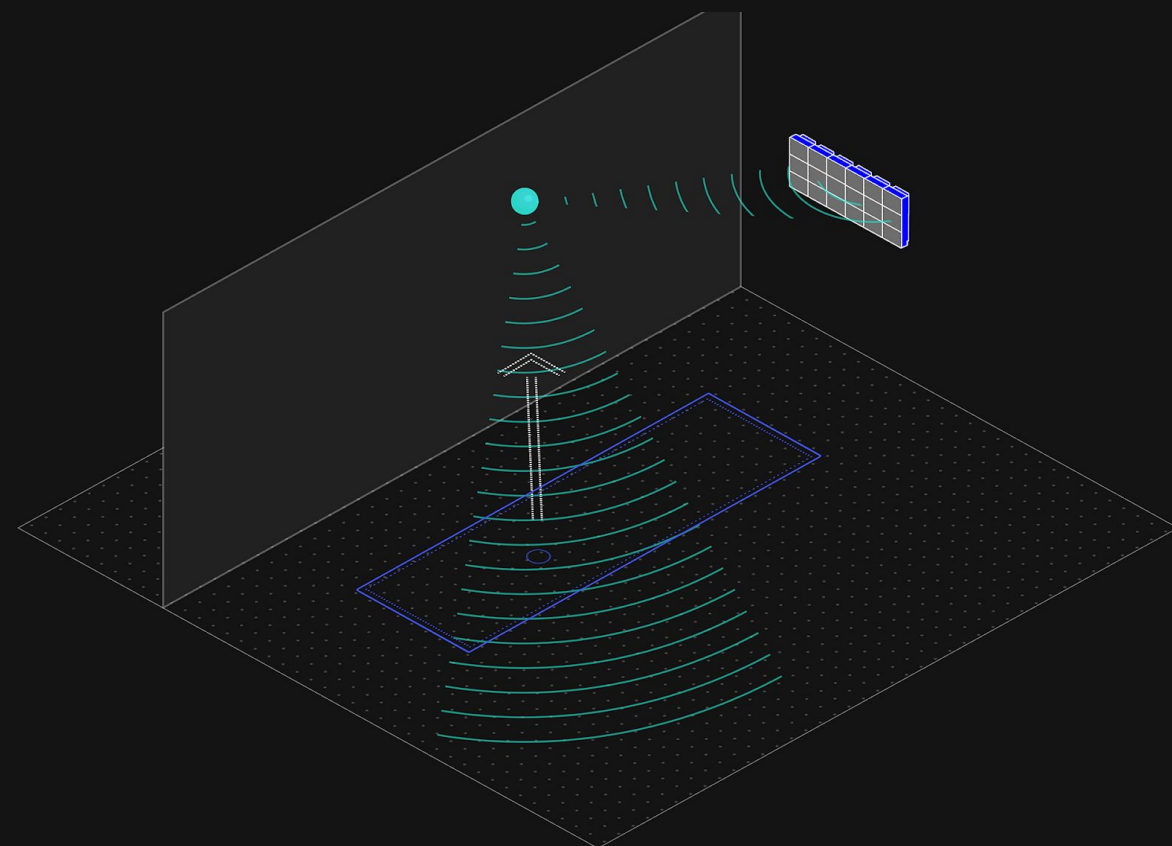
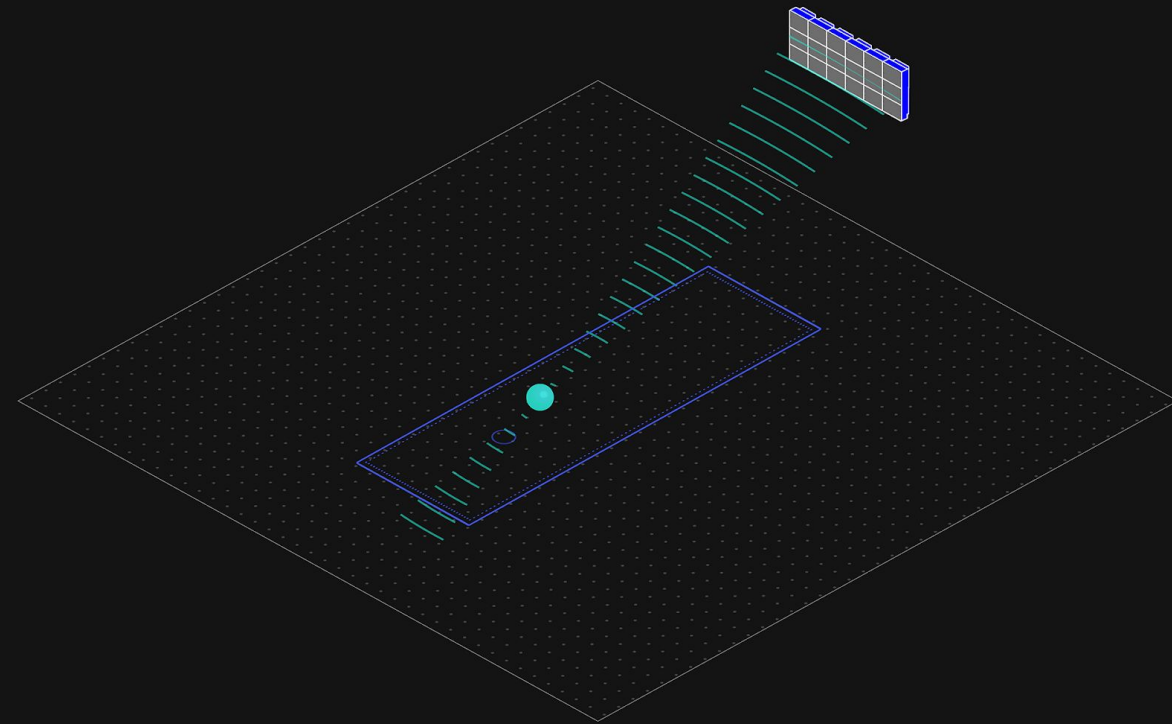
Wave Field Synthesis

Sound source behind array

Wave Field Synthesis is a sound reproduction technology designed to create immersive and spatial audio experiences.

With this feature, so-called virtual sources – acoustic starting points of the later rendered audio objects – can be authentically reproduced, freely placed in all three dimensions behind the HOLOPLOT Matrix Array, and even dynamically moved. Every single listener will genuinely perceive the virtual source in the same position, maintaining the relative distance and direction of every listener position.

Thus, sound is finally no longer identified as coming from the loudspeakers itself, but from the desired virtual starting points, creating a true-to-life, immersive soundscape.



Wave Field Synthesis

Sound source in front of array

A unique feature of the HOLOPLOT WFS technology is to place virtual sources in front of the Matrix Array right into the audience area. A powerful tool when it comes to creating an in-field localization, targeted reflections, or special effects at a specific listener position (sound proximity effect).

The sound level is relatively high in the focus point compared to the rest of the listener area. This is due to the energy concentration at such position from all the loudspeaker drivers of the HOLOPLOT Matrix Array.

HOLOPLOT

Game-changing audio technology with fundamental advantages over conventional solutions

Loudspeakers today

Uncontrolled & Inefficient

- ✗ Minimal to no control over to where sound is radiating
- ✗ Strong loss of sound volume over distance

Inflexible & Hardware based

- ✗ Performance predetermined by hardware
- ✗ One sound radiation pattern for all use cases

Sweet spot & Surround sound

- ✗ Best experience only for a small location & group of listeners
- ✗ No immersive sound, only more speakers for more surround

VS.

HOLOPLOT

Precise & Efficient

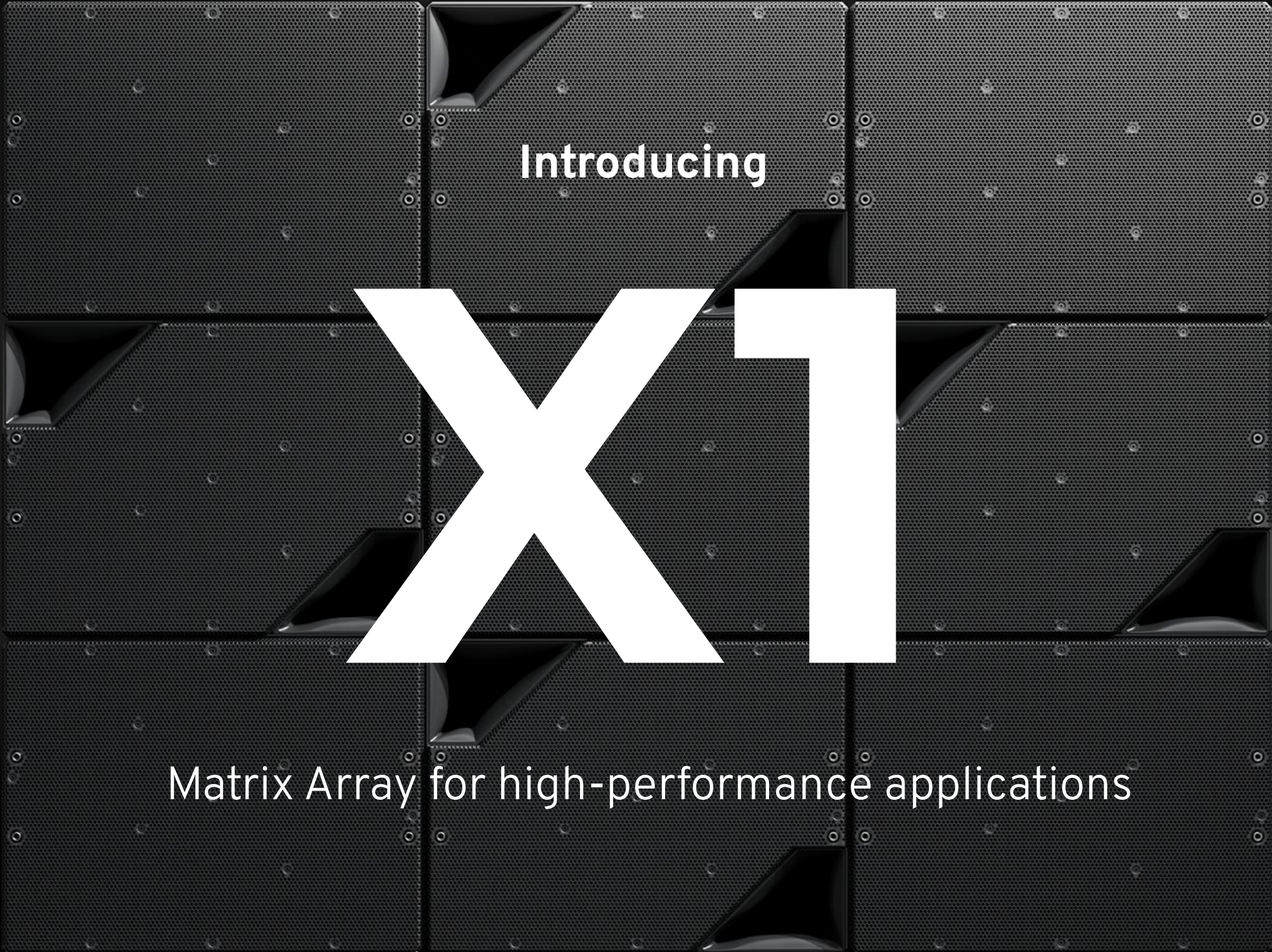
- ✓ Precise 3D control of sound with centimeter precision
- ✓ Almost no loss of sound volume over even large distances

Adjustable & Software based

- ✓ Real-time adjustments of performance via Software
- ✓ Infinite, custom sound radiation patterns for any use cases via SW

No sweet spot & Immersive

- ✓ Best and equal experience for the whole space and all listeners
- ✓ True immersive sound, also without the need to install speakers



Introducing

X1

Matrix Array for high-performance applications



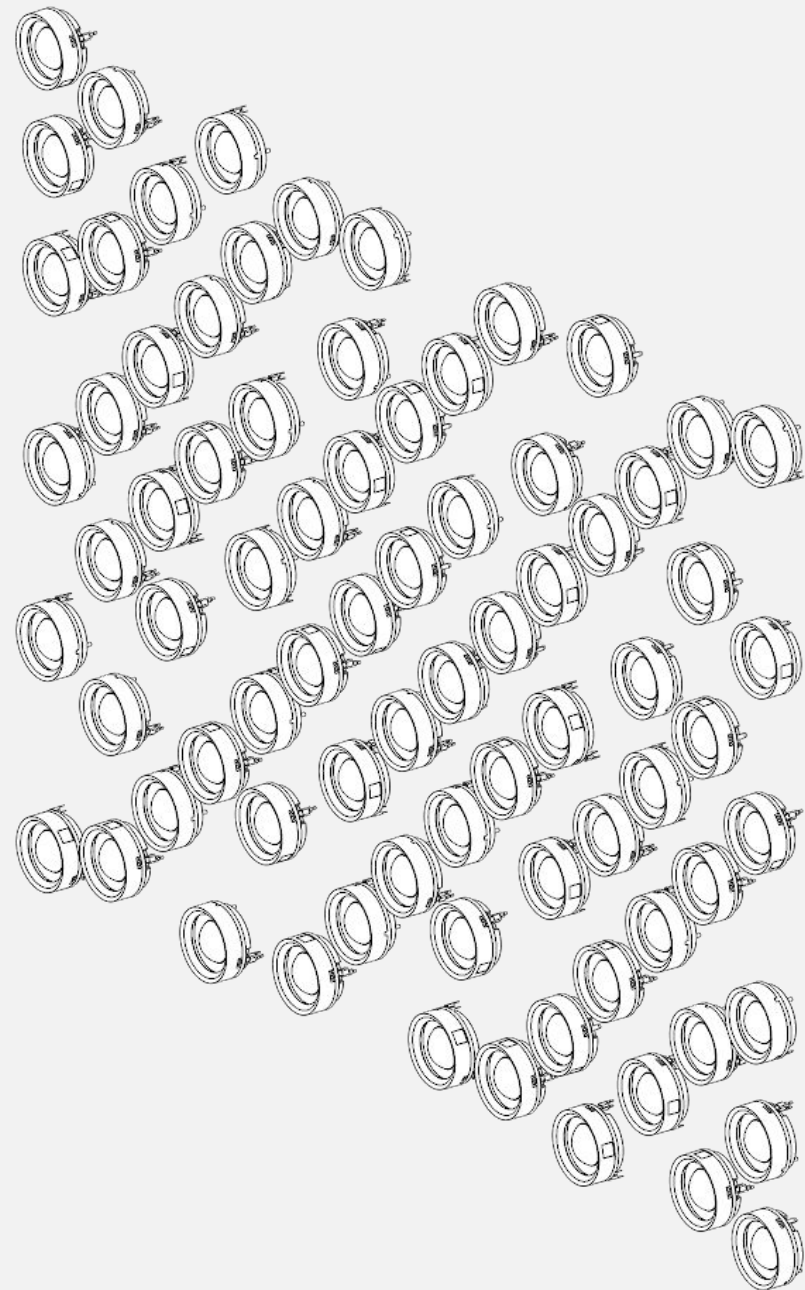
Modul 96
Full range



Modul 80-S
Full range + sub

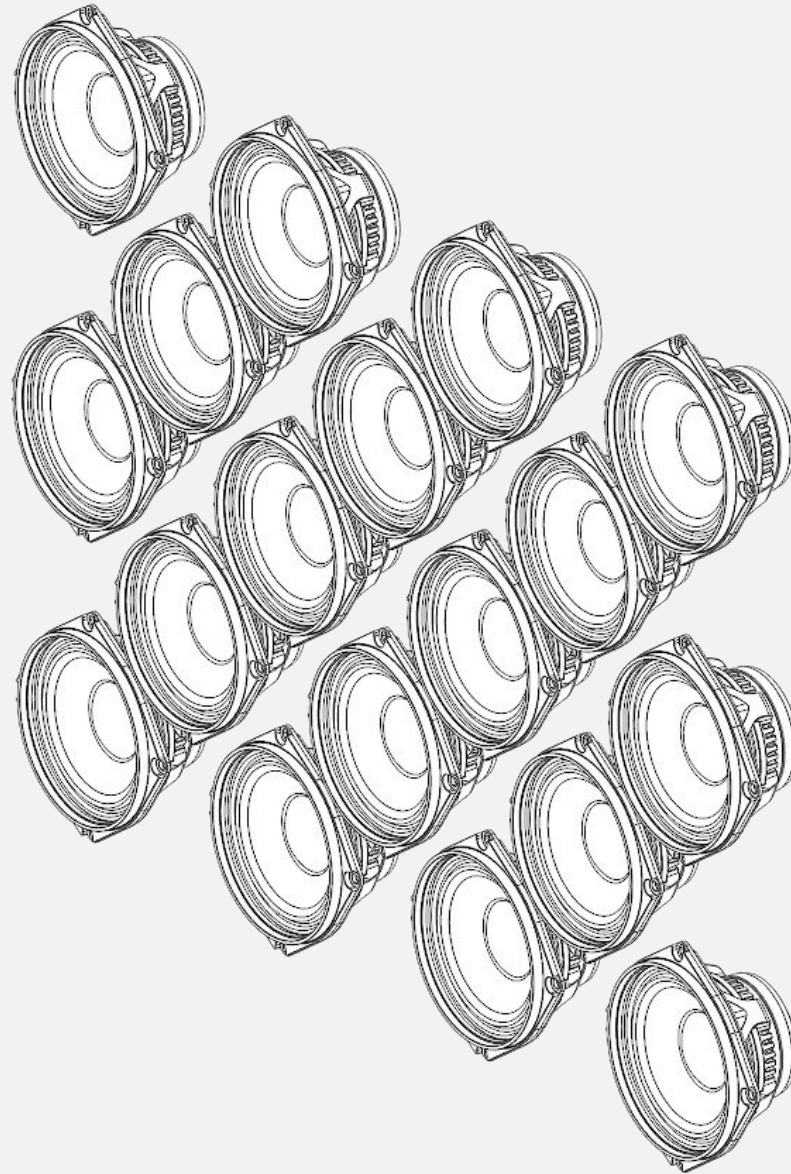
Two-Layer Matrix

The Full Range Modul 96



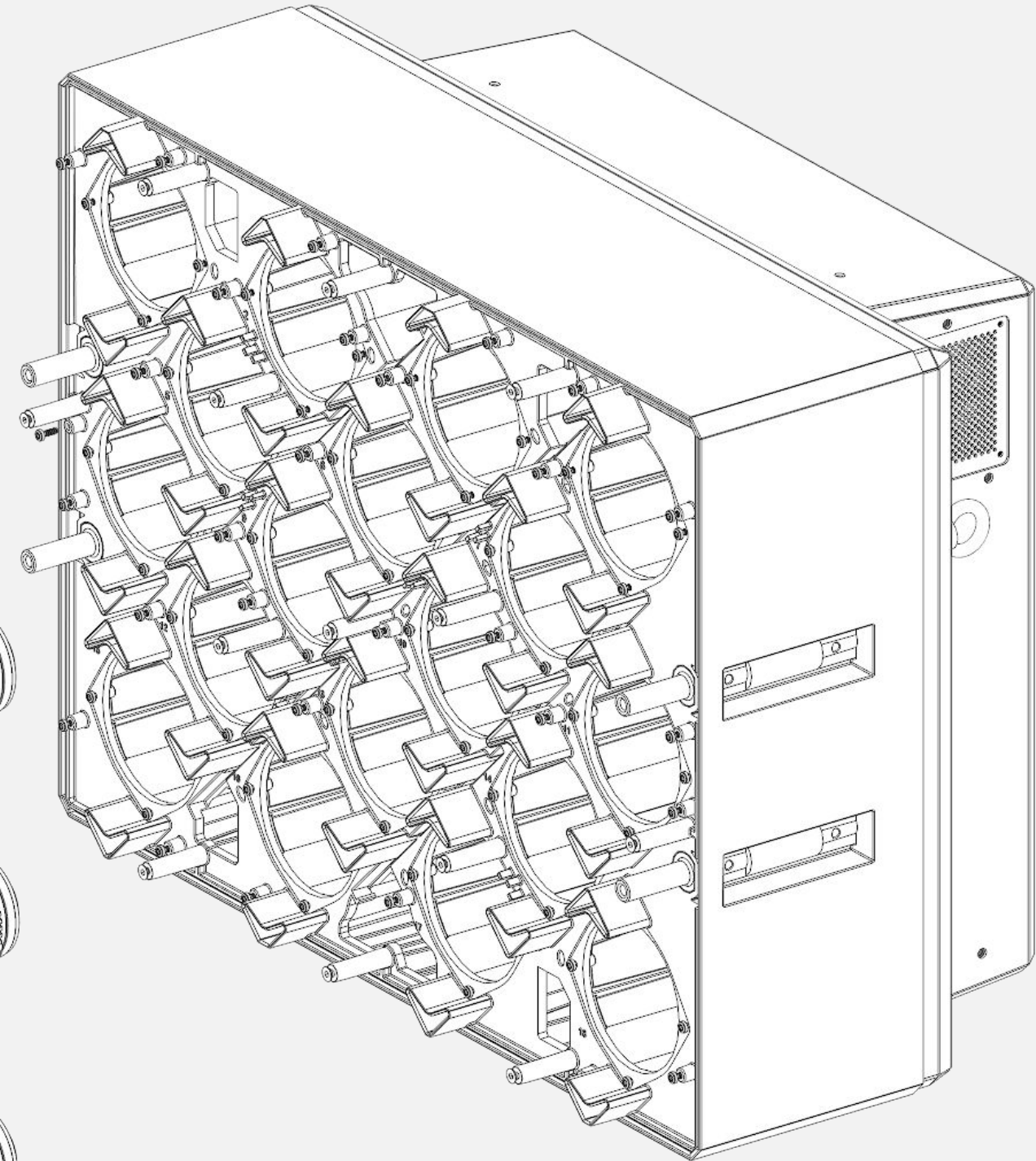
78x

1.3-inch high-frequency
soft-dome drivers coupled with
individual wave guides



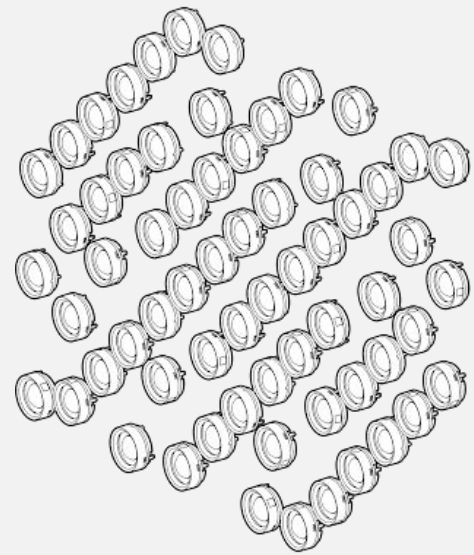
18x

5-inch low-frequency cone
drivers in individual
dual-ported chambers



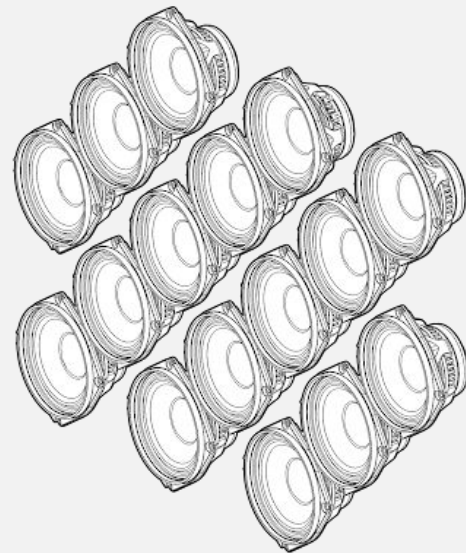
Three-Layer Matrix

The Full Range Sub Modul 80-S



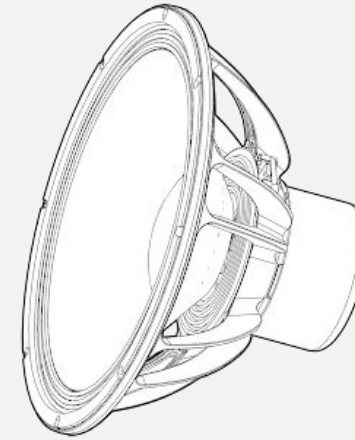
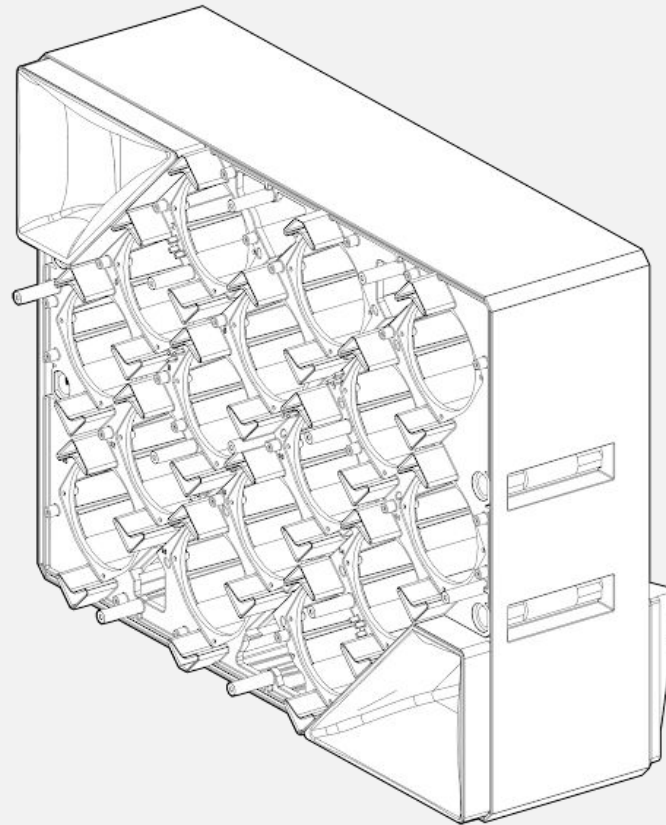
64x

1.3-inch high-frequency
soft-dome drivers coupled with
individual wave guides



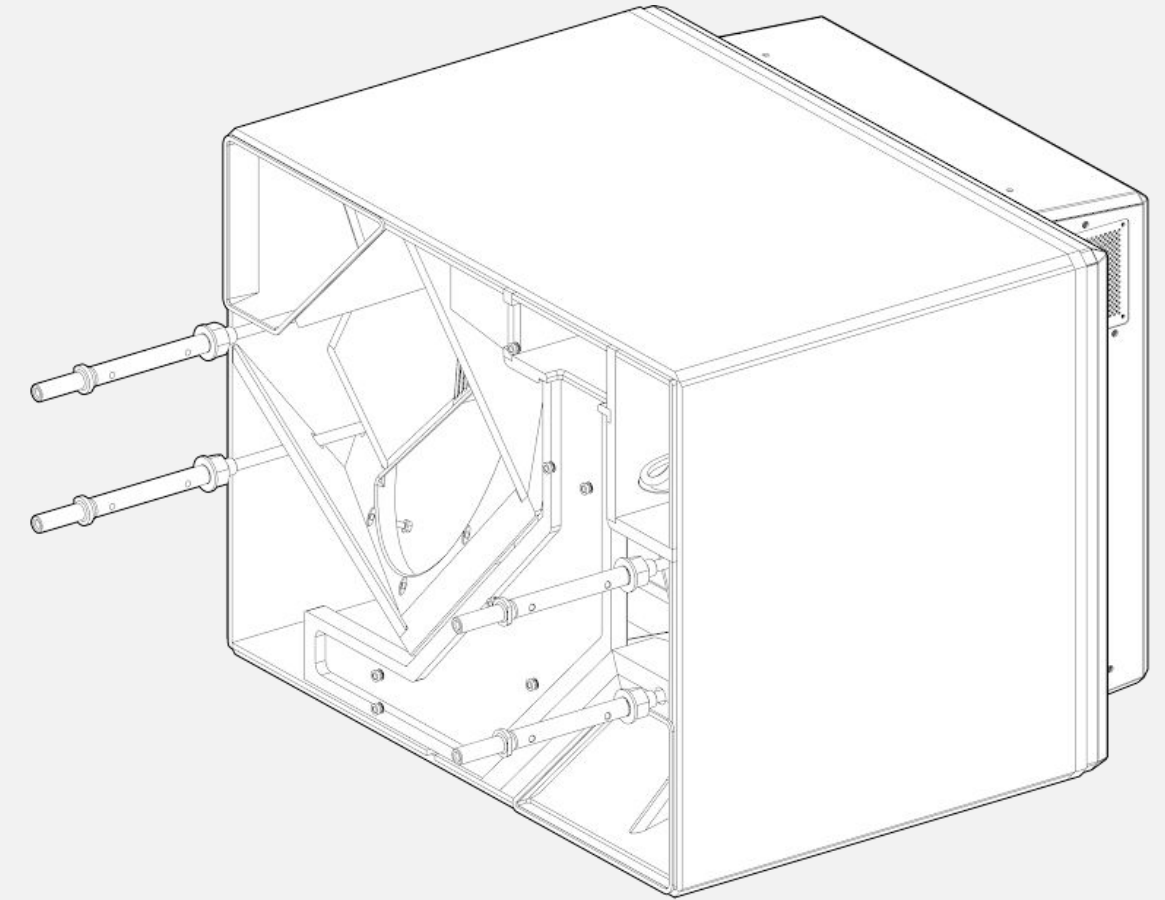
16x

5-inch low-frequency cone
driver in individual
dual-ported chambers



1x

18-inch sensor-controlled subwoofer
with two high energy, high density
neodymium-iron-boron magnets in a
bandpass enclosure with air-flow
optimised ports



Seamless scalability
through modularity

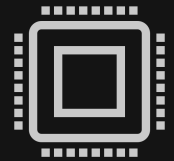


Electronics Package

The Intelligence Behind X1



6 x 16-channel digital amplifier modules



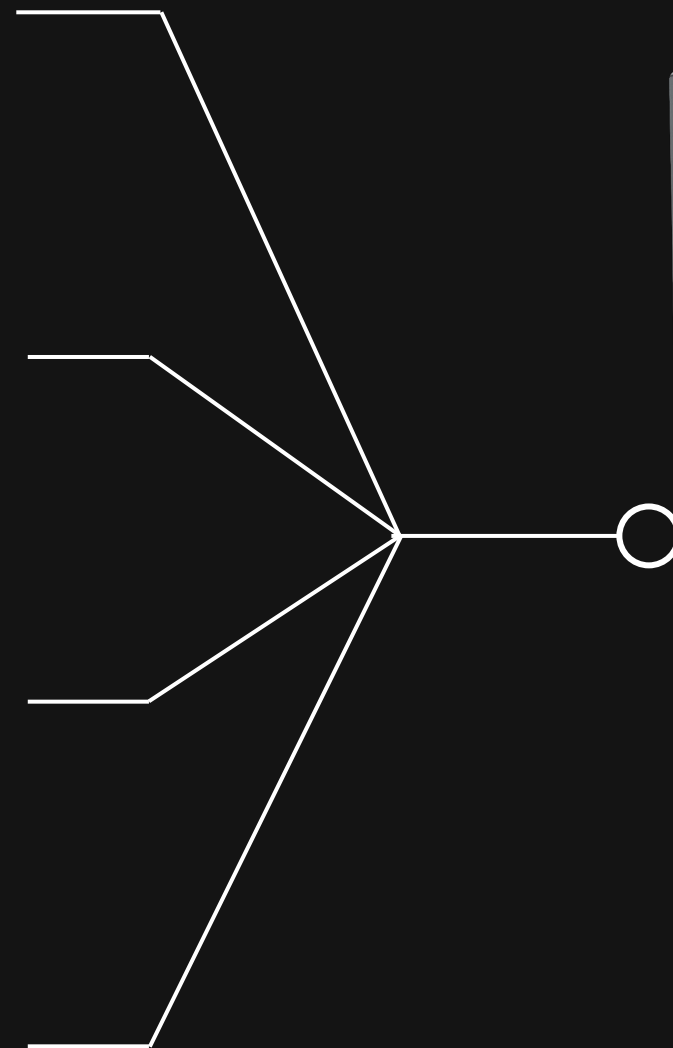
High-performance FPGA for advanced signal processing



Health and performance monitoring of system and components



Remote access & over-the-air updates

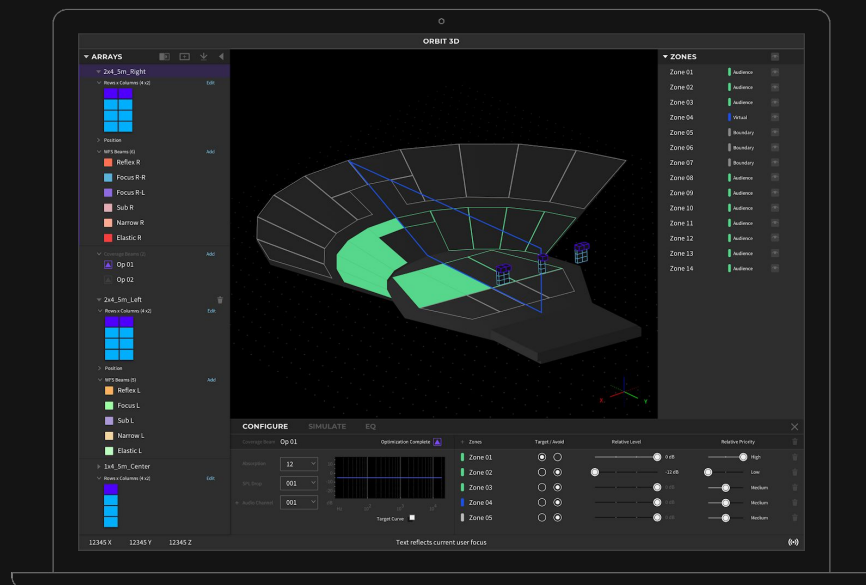


Software & Core Technology

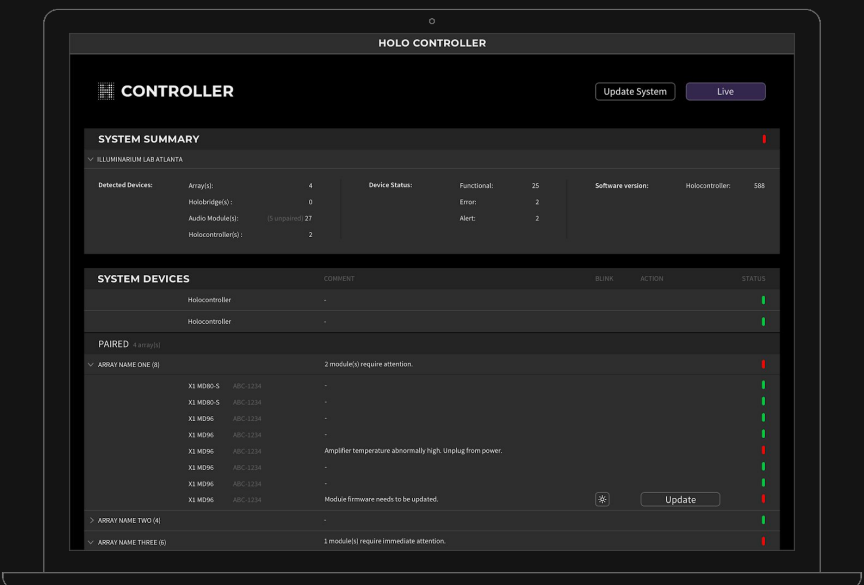
Evolving performance through updates & upgrades

Applications

Planning Tool
Design & configure



Control Interface
Operate & monitor



Core Technology

HOLOPLOT OS
Linux-based, distributed
Audio Operating System

HOLOPLOT
OS

HOLOPLOT Algorithms
3D Audio-Beamforming &
Wave Field Synthesis

HOLOPLOT
DSP

HOLOPLOT

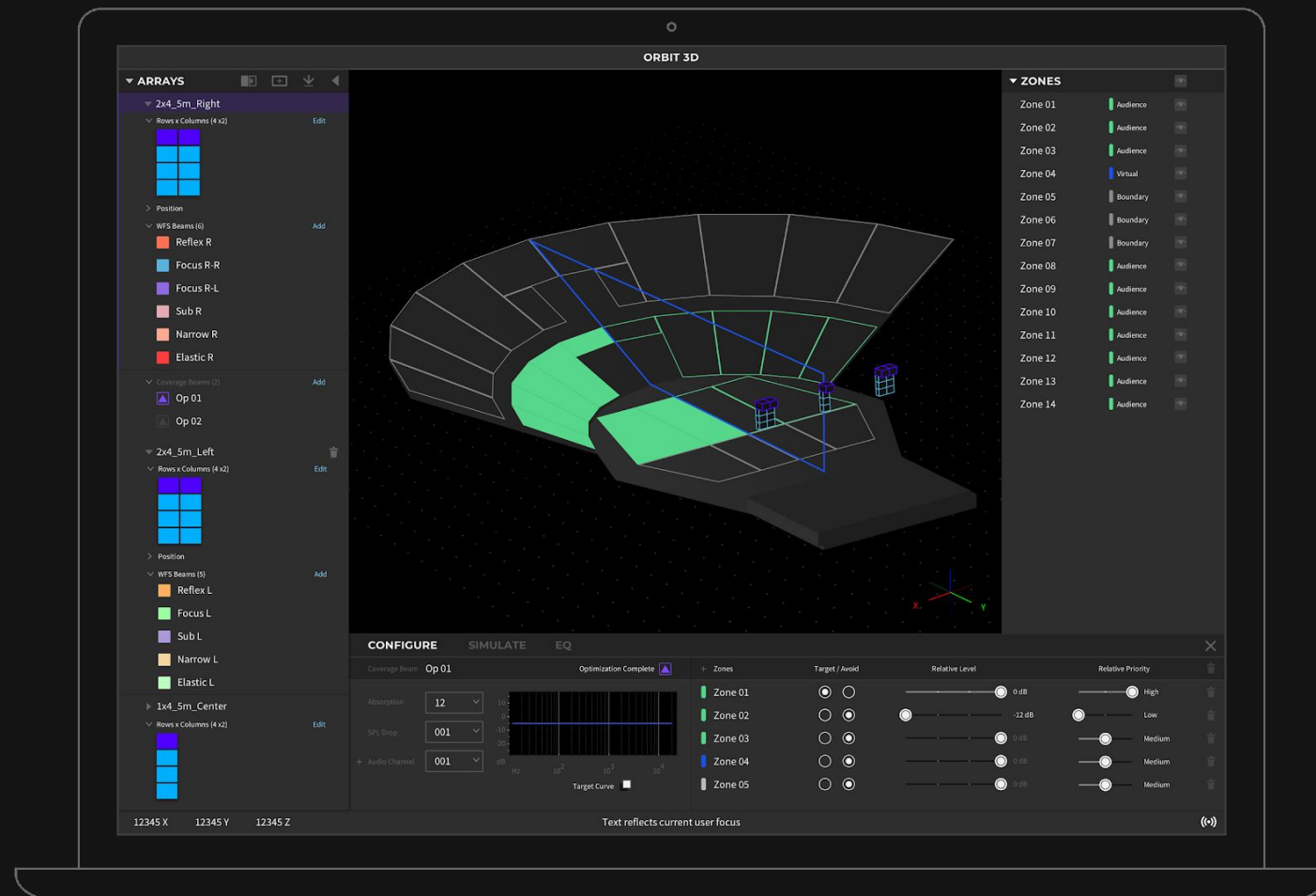
HOLOPLOT Plan

Design & Configure

With HOLOPLOT Plan, designing, simulating and setting up a HOLOPLOT Audio System is simple and intuitive.

Providing a 3D graphic interface, it enables the user to design Matrix Arrays of different sizes and create sound fields based on Audio-beamforming and Wave Field Synthesis technology. Venue models are imported from standard 3D modeling software such as Sketchup.

The tool simulates and visualises direct sound pressure levels. For further analysis and advanced simulations, projects can be exported to EASE.



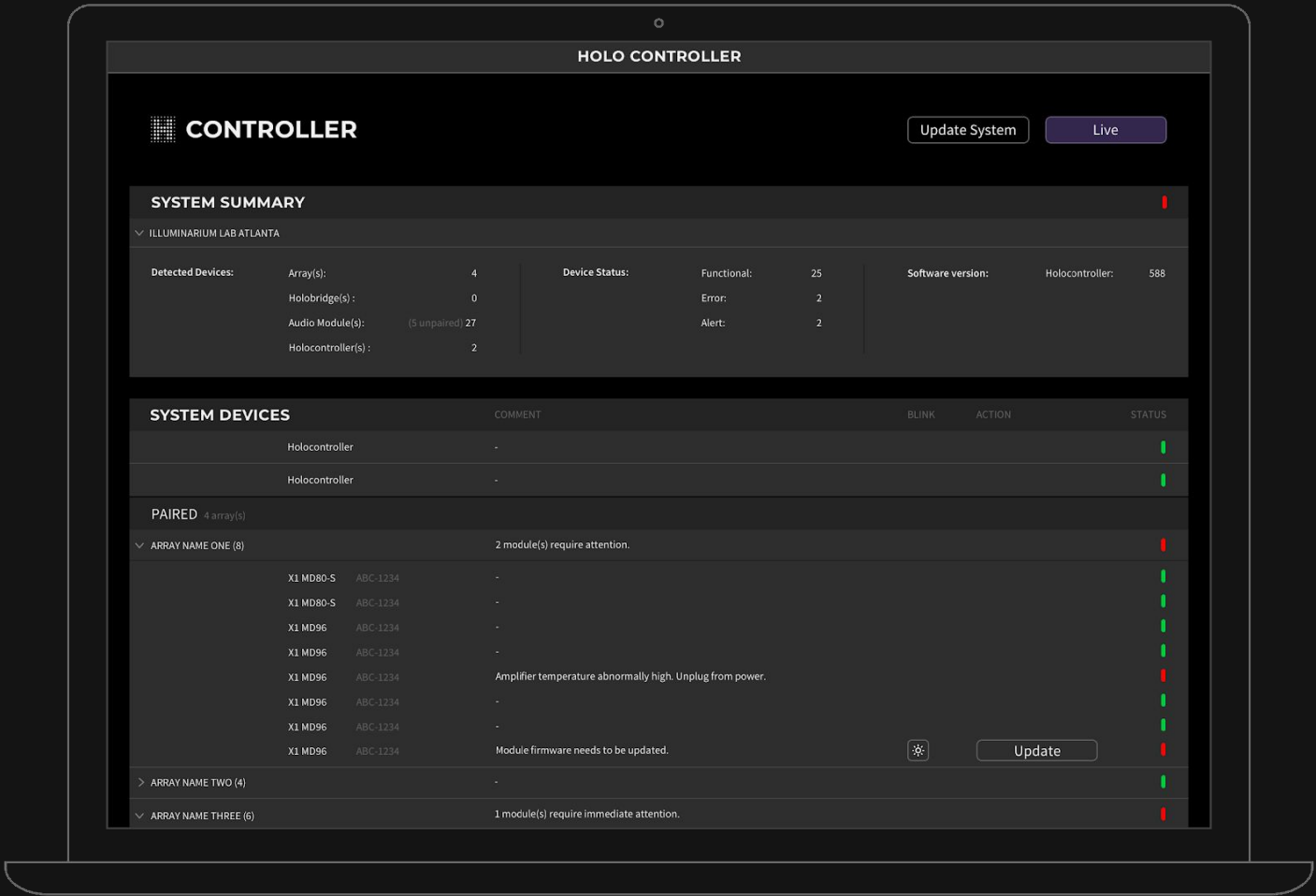
HOLOPLOT Control

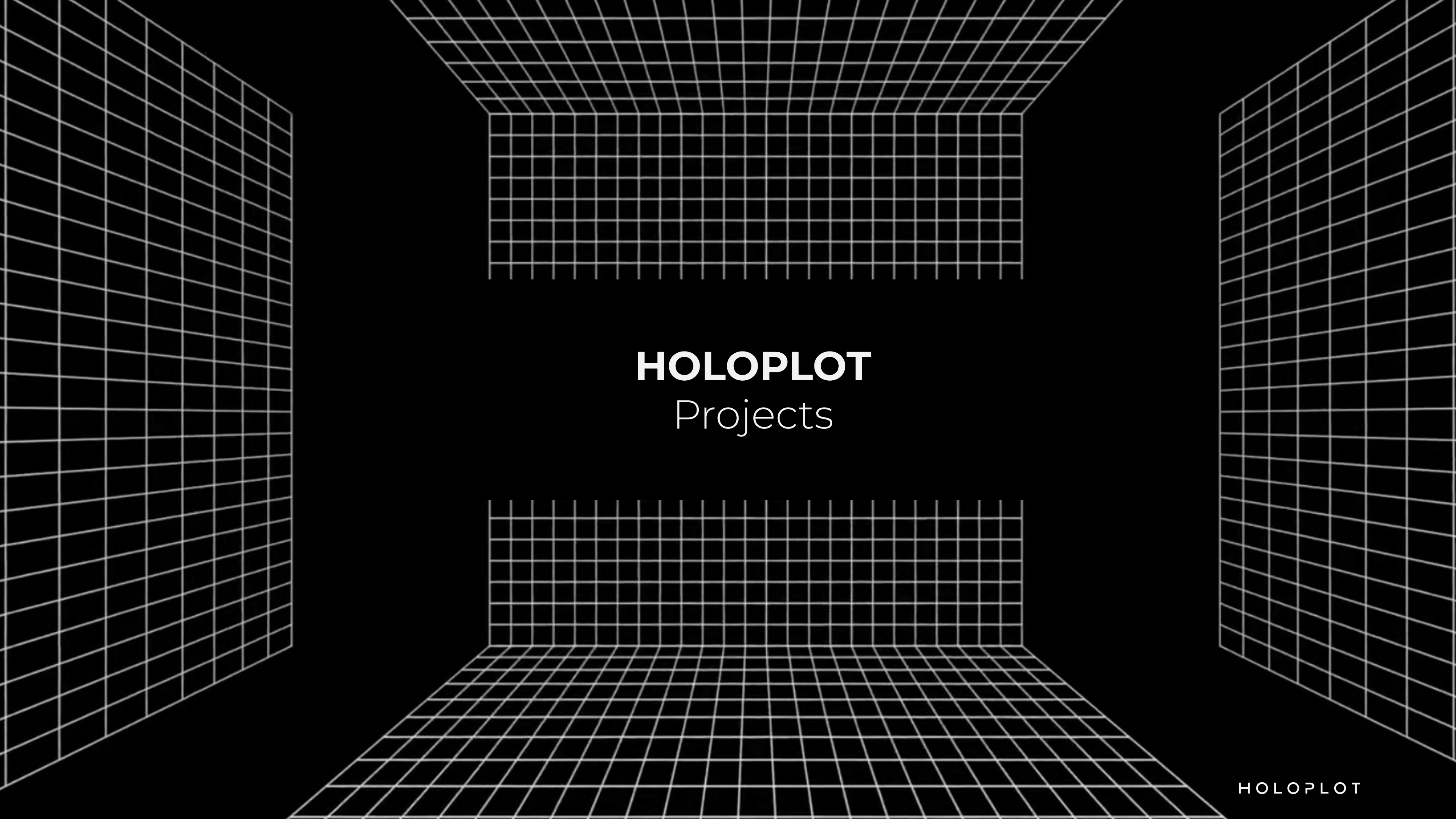
Monitoring & Control

The HOLOPLOT Control makes managing and operating a HOLOPLOT Audio System efficient and hassle-free.

By displaying essential system data (such as component health or network status), it aids technical staff in operating and maintaining the entire system.

As a first level gateway to the system, it not only allows users to monitor audio performance but also to control the system (e.g. master volume and equalization).





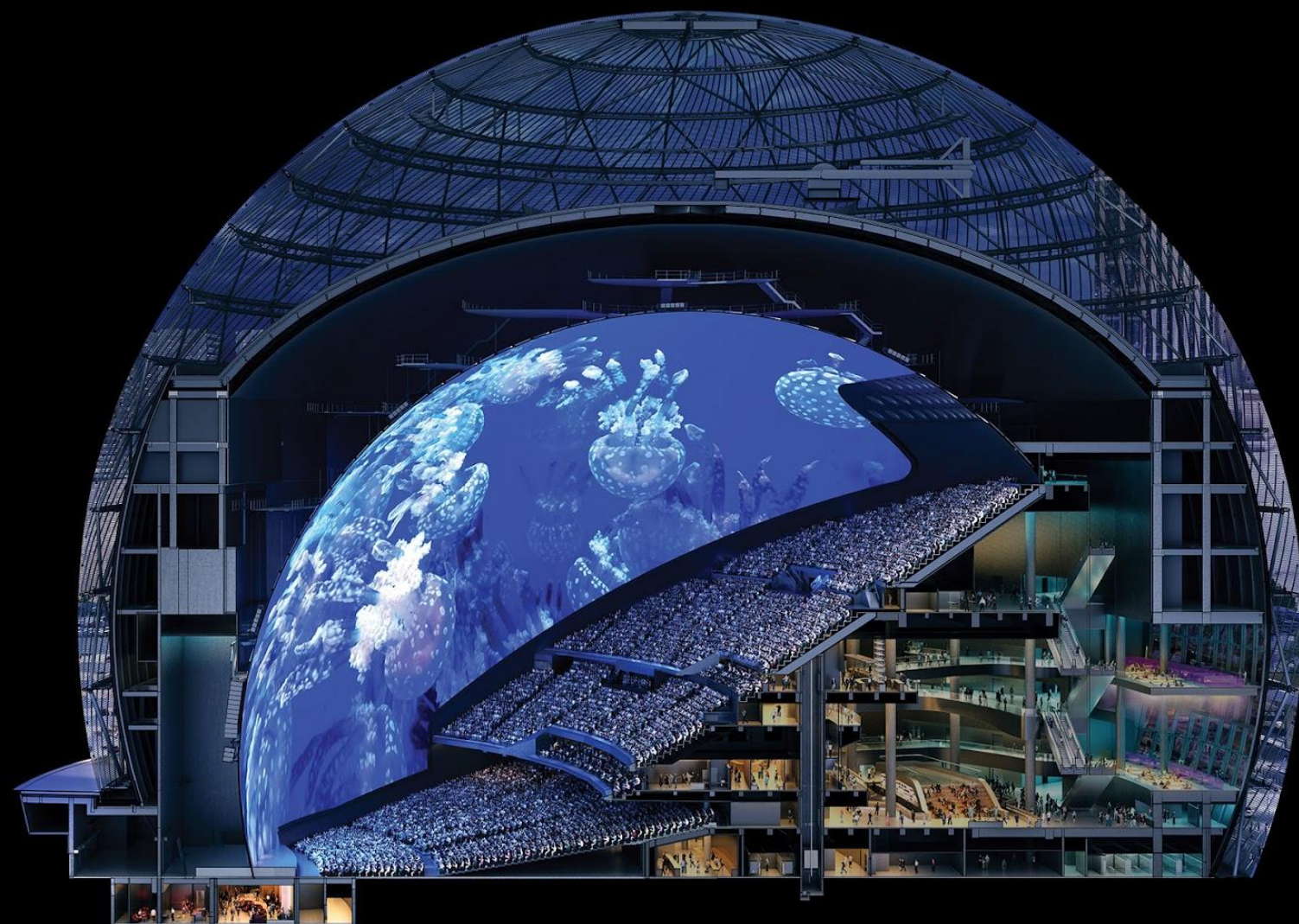
HOLOPLOT

Projects

A large digital globe projection in a city at night. The globe is blue and white, with a network of glowing lines and points overlaid on it. It is surrounded by a crowd of people and cars. In the background, a city skyline is visible, including a large Ferris wheel illuminated with red lights.

MSG Sphere, Las Vegas - USA

powered by HOLOPLOT



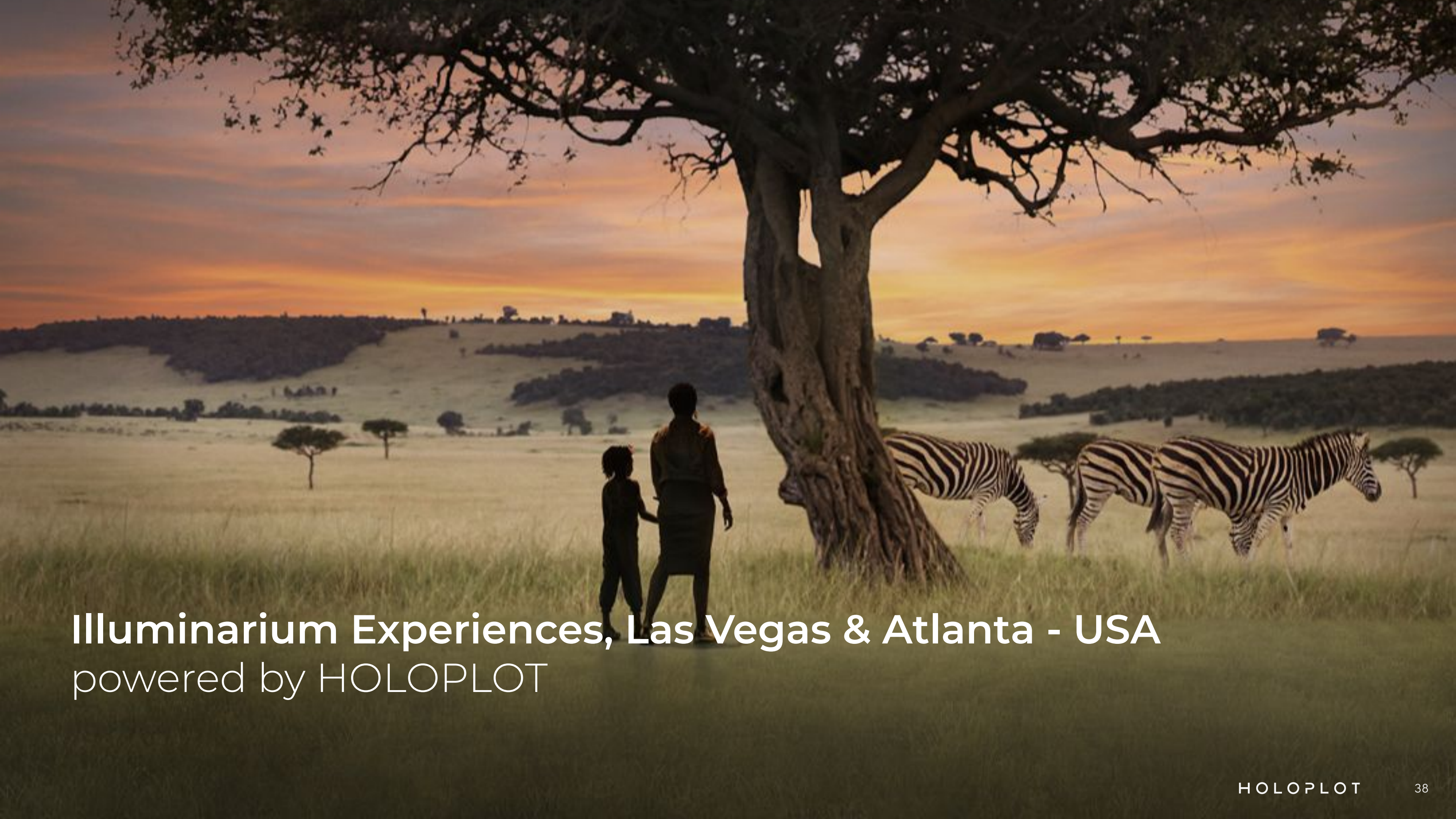
Ambitions meets complexity

World-class audio performance at scale

The MSG Sphere, a venue by the Madison Square Garden Company currently under construction in Las Vegas, is one of the most ambitious AV-projects of our times. As a true *reimagining of what is possible for live events and the arts*, the Sphere relies on groundbreaking technologies to turn vision into reality.

Challenges the audio system had to solve

- Exceptional sound in a dome-shaped architecture
- Audio system invisible, behind world's largest LED screen
- Large distances between audience and sound system (+320 ft)
- Homogeneous coverage across the whole audience
- Accurate aural localization in harmony with the visual of world's largest LED display

A savanna landscape at sunset. A large, dark acacia tree stands in the foreground. To its left, a woman and a young child stand in silhouette, looking out over the horizon. To the right of the tree, three zebras are grazing in the tall grass. The sky is a mix of orange, yellow, and purple, with a few distant trees visible on the horizon.

Illuminarium Experiences, Las Vegas & Atlanta - USA

powered by HOLOPLOT

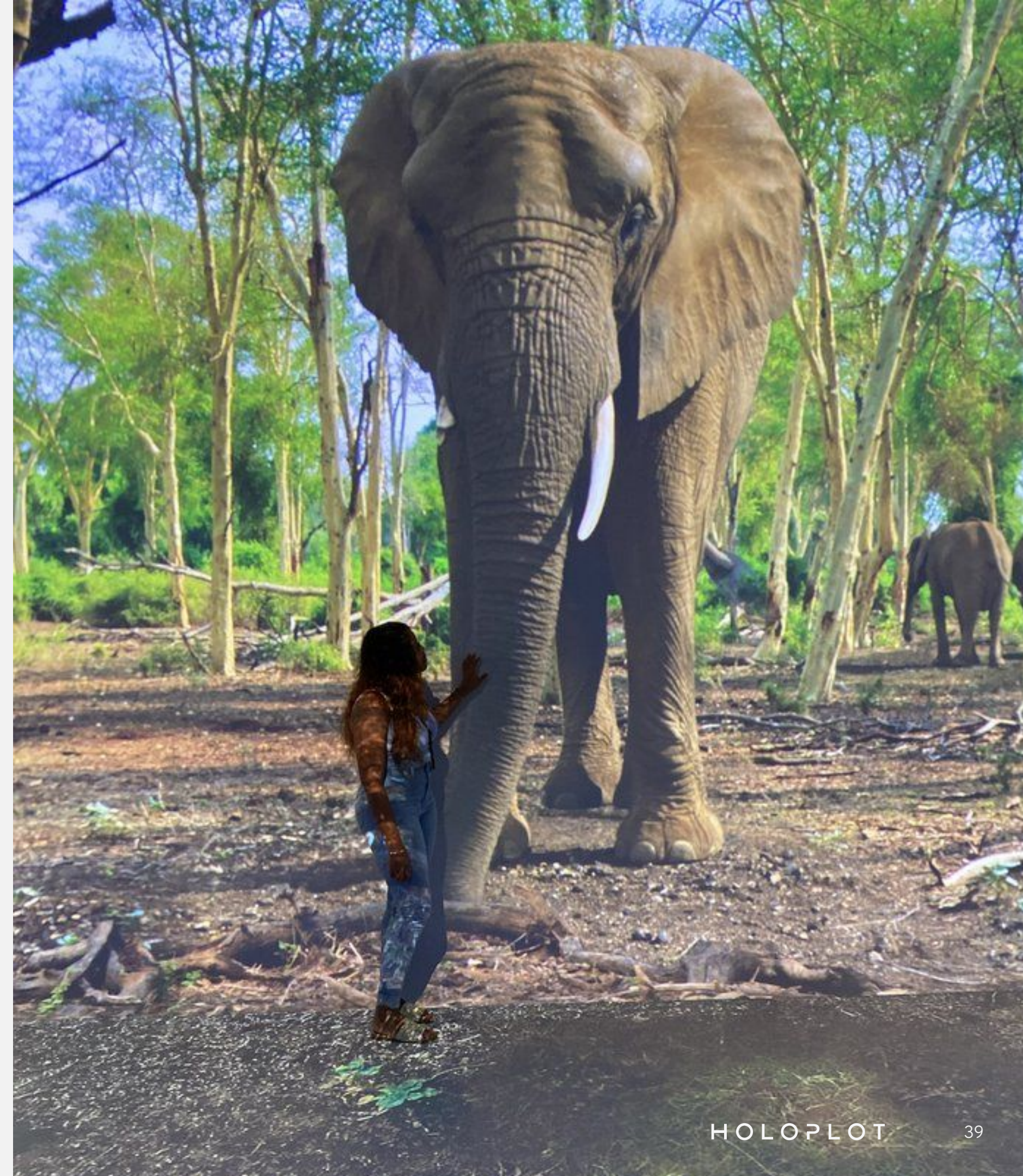
Venue challenge #1

Recreate a sound environment that matches the visual projections

Unlike conventional technologies, HOLOPLOT audio objects are not restricted to the 2D surface of the projection wall. Sound designers can play with depth, so an audio object can appear to be far away or, on the other hand, whisper in your ear.

HOLOPLOT spatialization algorithms, its homogeneous coverage and optimized arrival times enable visitors to accurately localize audio objects and their trajectory across the venue, in perfect synchronicity with the distinct visual show elements.

Customised system design ensures that any audio object location can be authentically reproduced.



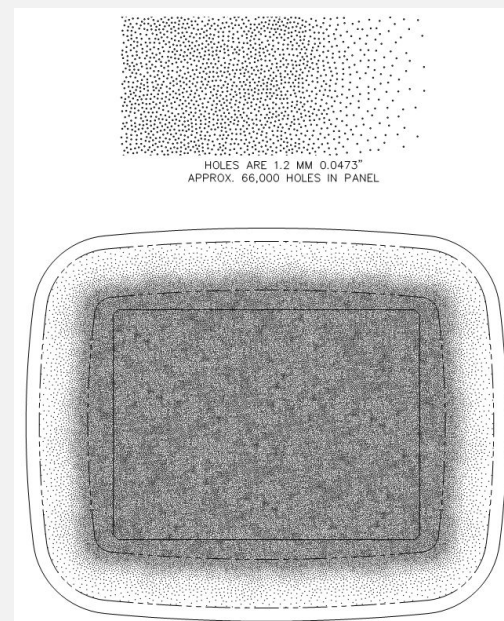
Venue challenge #2

Conceal the audio technology, making it invisible to the eye

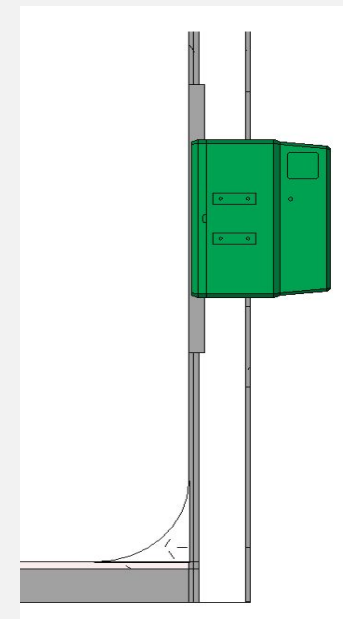
The audio modules are built in to the walls of the exhibition, positioned behind a specially designed micro perforated wall panel.

The combination of HOLOPLOT module and strong MDI panel has been extensively tested. Transmission losses from the MDI panel were measured in 3D space to later be compensated in the HOLOPLOT optimization engine.

The result is a clear, full range sound with virtually no coloration and a completely unobstructed visual projection surface.



Detail of the microperforated panel designed for the HOLOPLOT Audio Modules



Section view of a HOLOPLOT Audio Module positioned behind the screen within the wall build-up

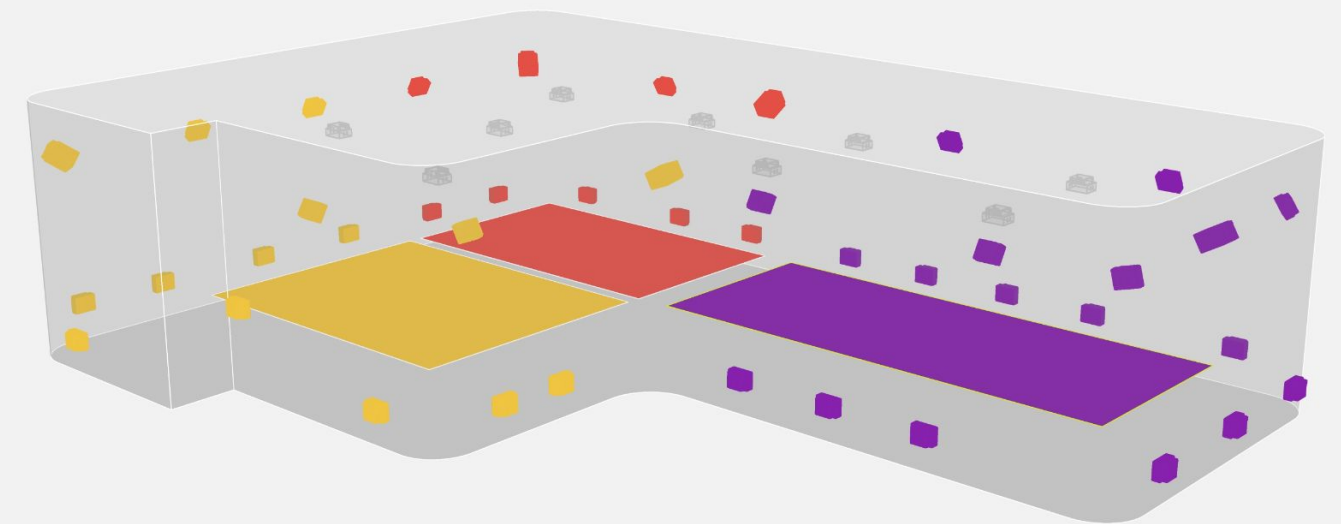
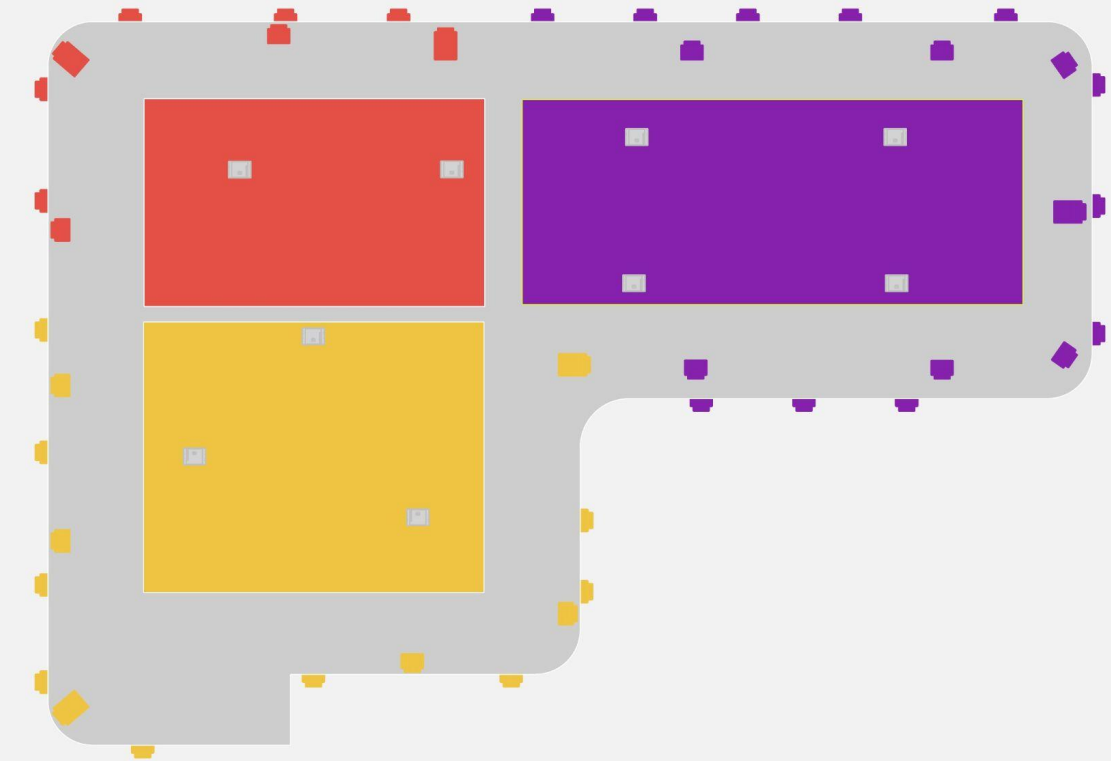


Venue challenge #3

Create different audience zones each with unique content in one large room, that can also be one zone

The unique HOLOPLOT 3D beamforming technology allows for multiple precise audio zones to be created. A HOLOPLOT audio module can, independently or collectively, generate multiple sound fields simultaneously – each with its own content, equalization, level, shape, and position.

For each zone the modules in that section are all optimised to form a soundfield capable of enveloping the listener and operating as an independent spatial audio system. Allowing the visual designer to create separate scenes within a single space and ensuring synchronicity of the audio content to that scene.



Illuminarium Room 1

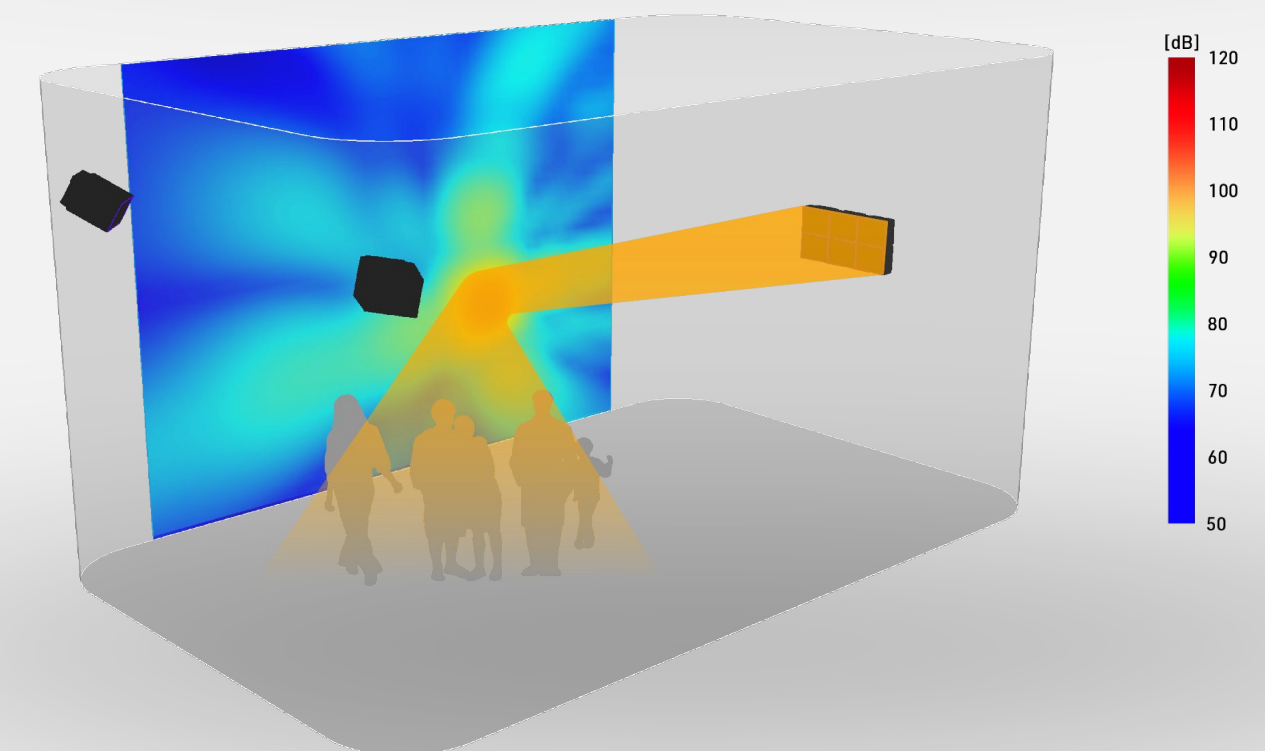
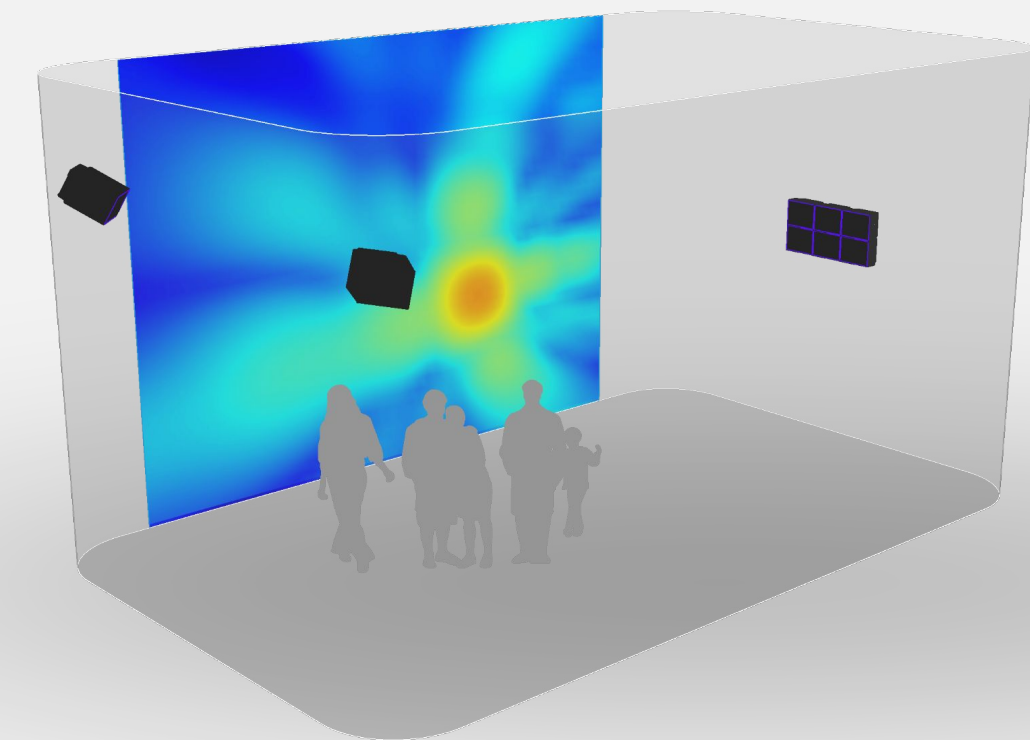
Targeted zones

Focused coverage with reflectors

Using reflectors, the central Matrix Array positioned above the room entrance can generate tightly focused sound beams. It's therefore possible to create an audio source where no physical speaker is placed - a powerful tool for delivering targeted sound experiences, and creating special effects at specific listener positions.

The beam has been set up with a vertical steering angle of 12.8° and a horizontal steering angle of 38.7° . In this configuration, the intended listener position is at approximately 12 m (~39.4ft) in front of the array, at 1.60m (~5.2ft) above the floor level (ear height).

The reflection plot indicates how and within which frequency bands the beam focuses a given signal outputted from the central matrix array.



Definition of points on walls in Illuminarium 1 for reflections assessment

Illuminarium Room 2

Creating Narrow Zones

Two modules active

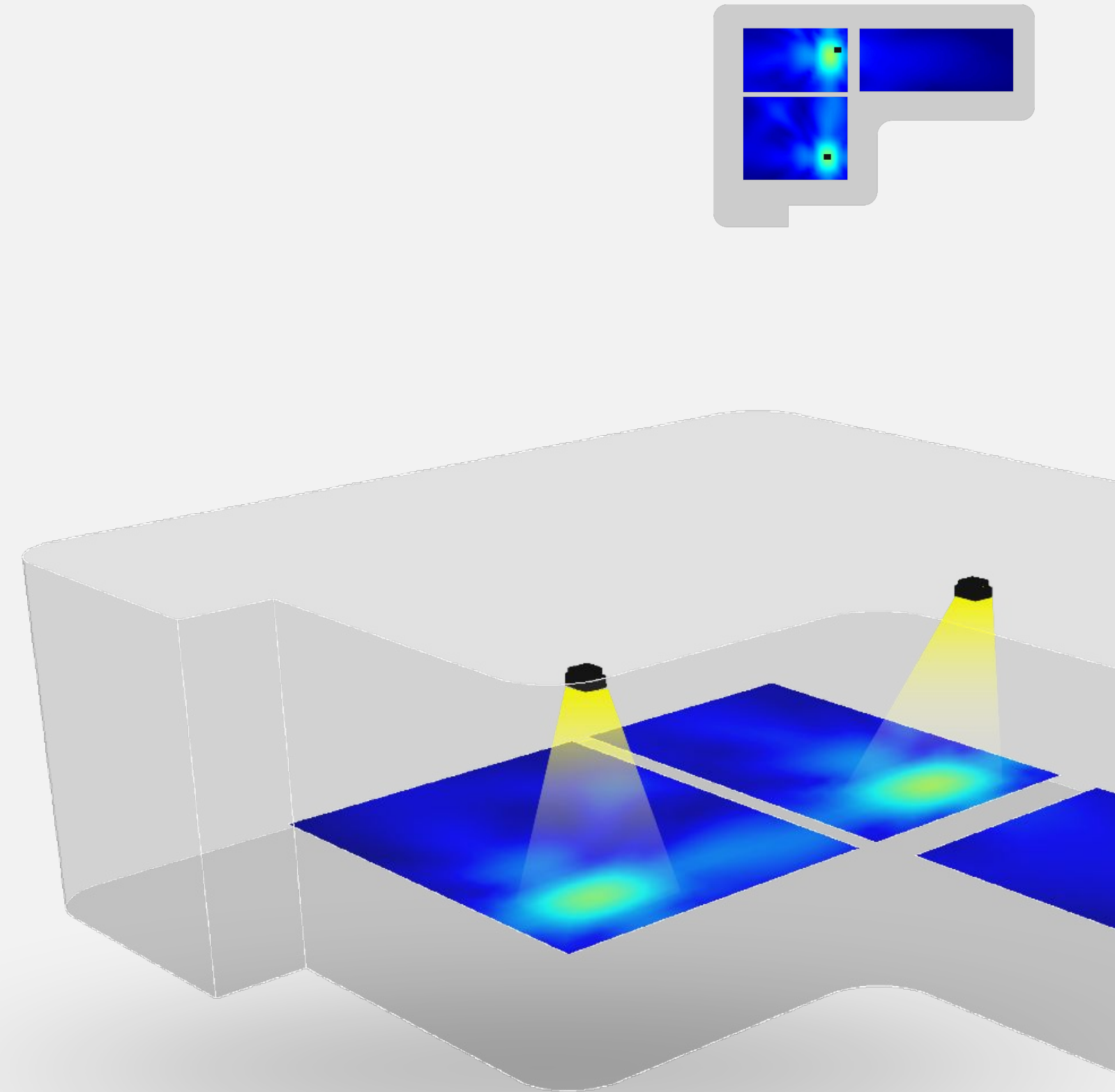
The HOLOPLOT X1 system can be used to create precise focus spots with varying diameters. Each focus spot can reproduce unique content.

Narrow zones such as this allow for the creation of individual audience experiences as the exhibition is explored.

For illustration: Narrow zones in Illuminarium 2 - 2kHz

2kHz octave band levels for two overhead modules targeting a small spot slightly off-axis. Clear hotspot visible as intended with little spread around it (1-1.5m).

Zone 2B Spot vertical steering angle 8.3° , horizontal steering angle 3.4° .
Zone 2C Spot is on the axis of the active module.

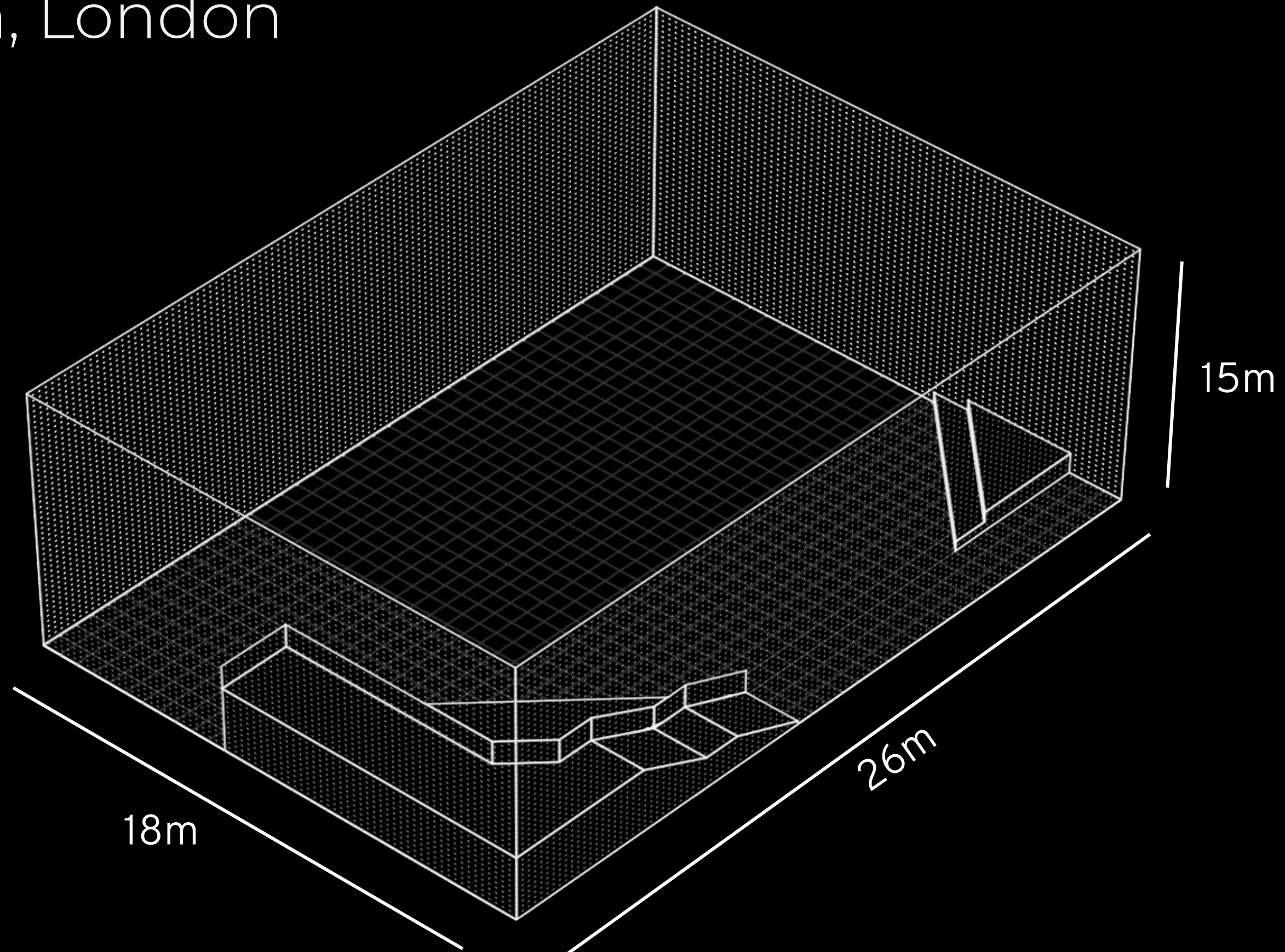




Lightroom, London - UK
powered by HOLOPLOT

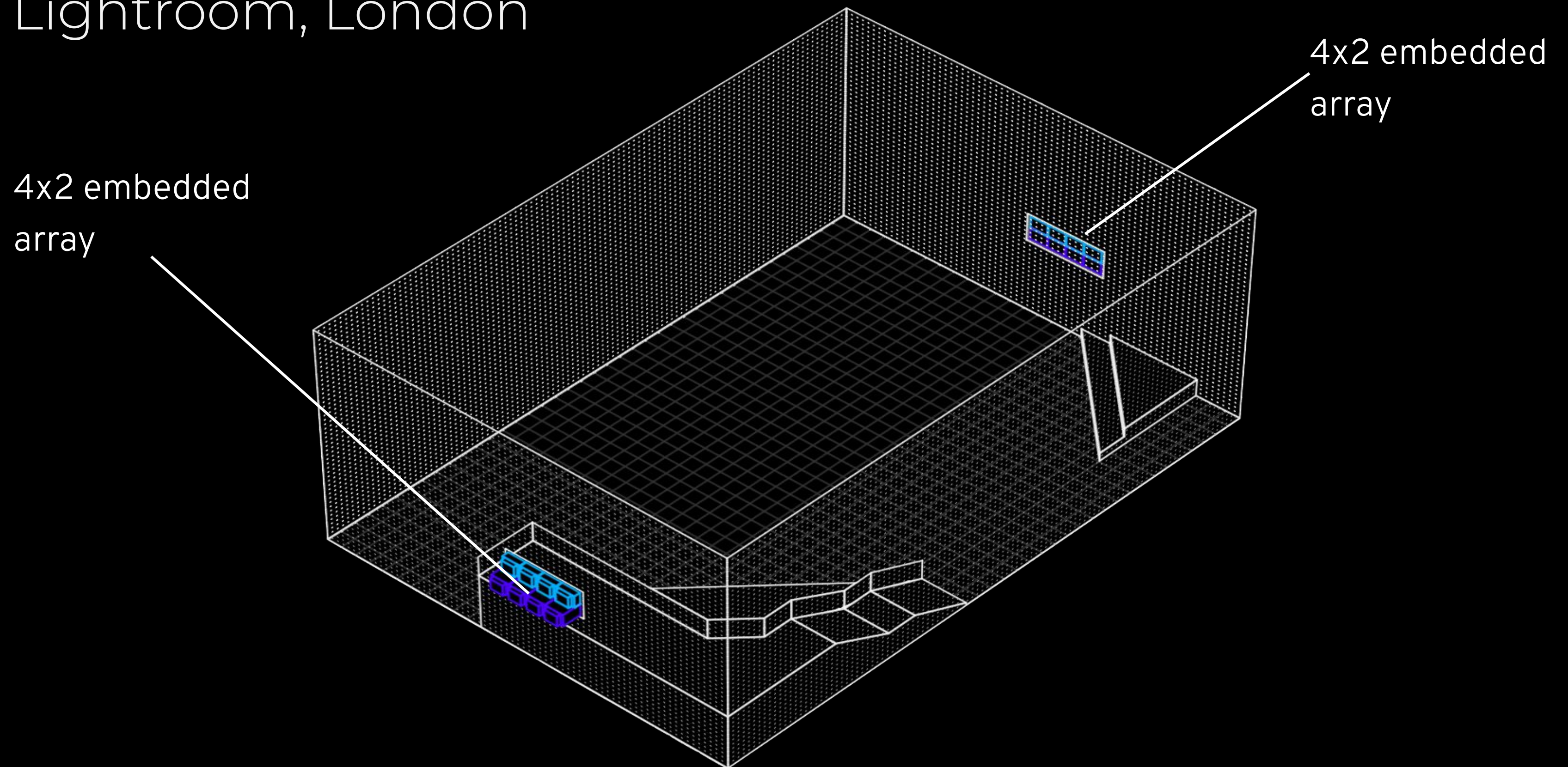
The room

Lightroom, London



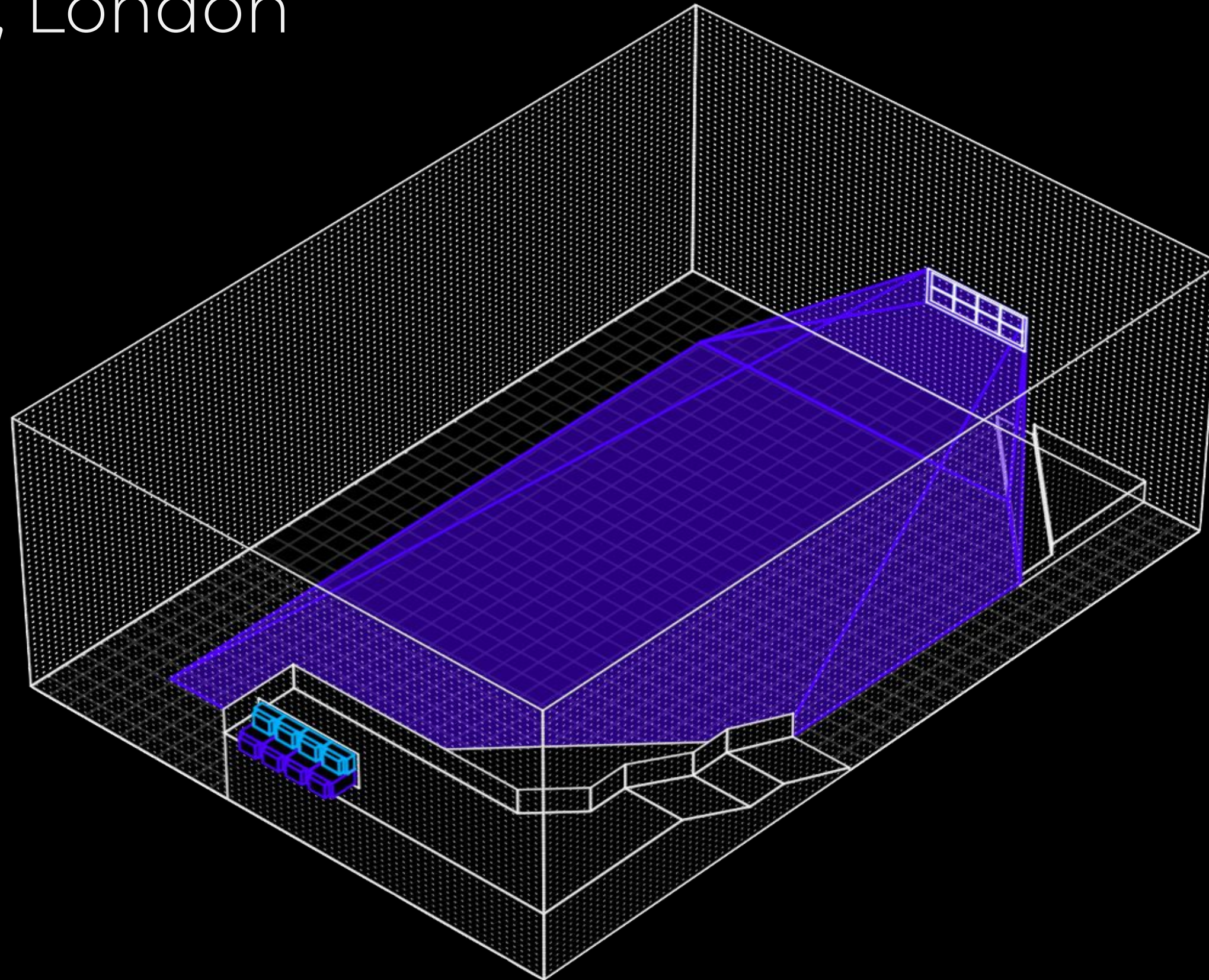
The system design

Lightroom, London



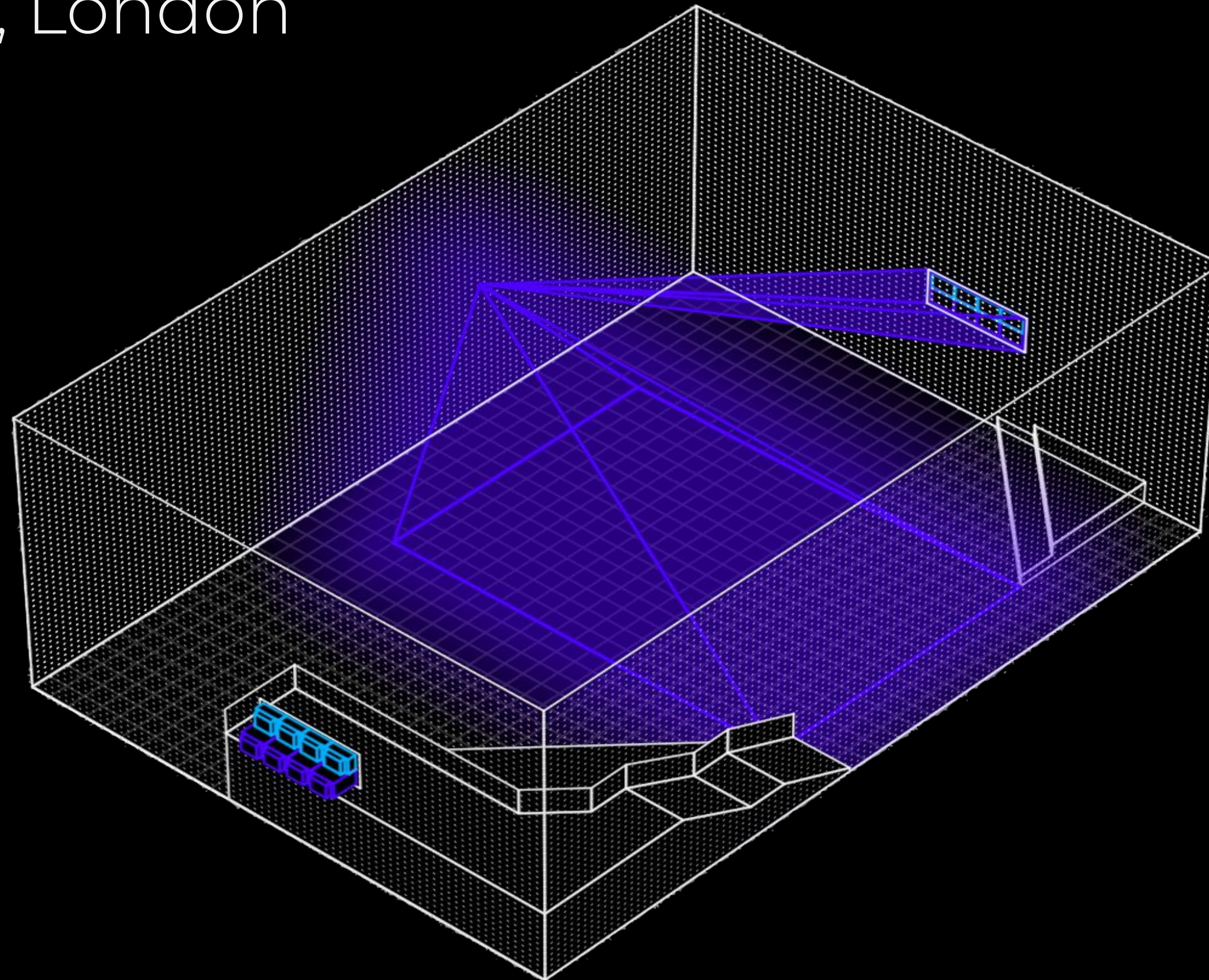
The coverage

Lightroom, London



Reflected beams

Lightroom, London



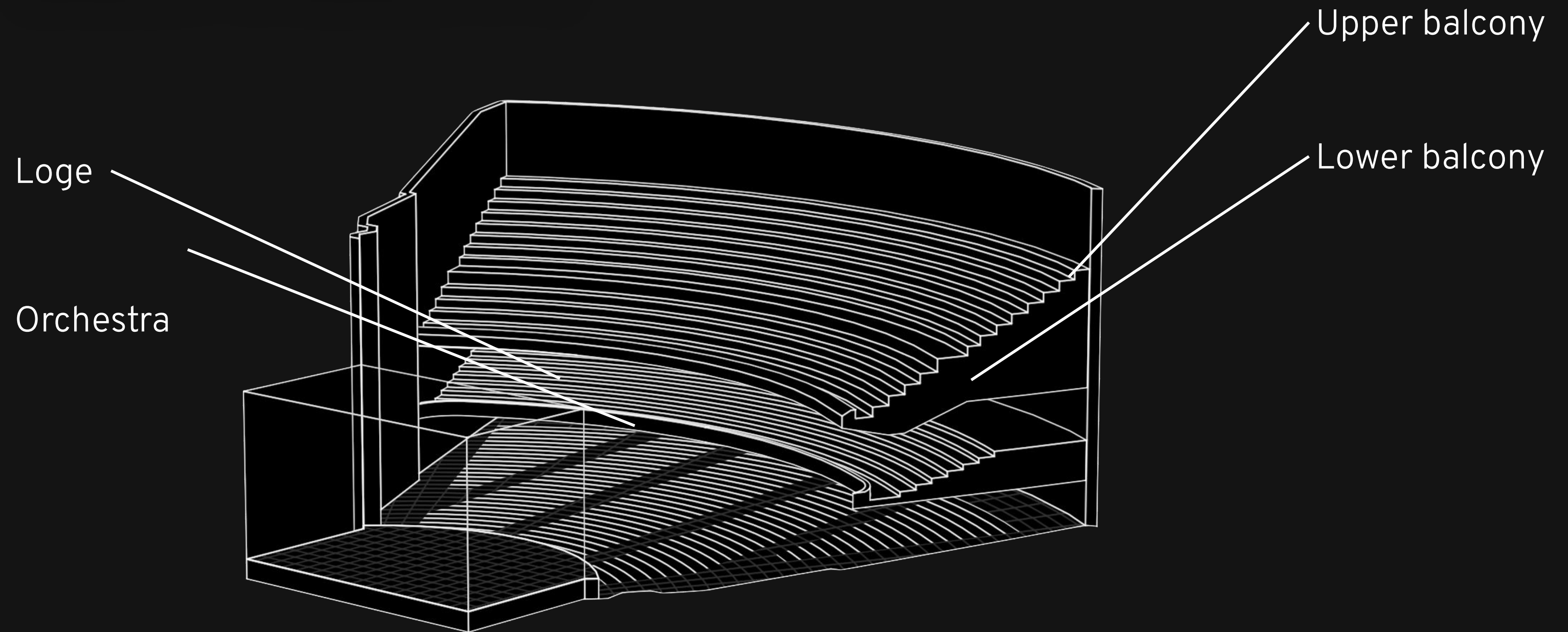
The venue

Beacon theater, NYC



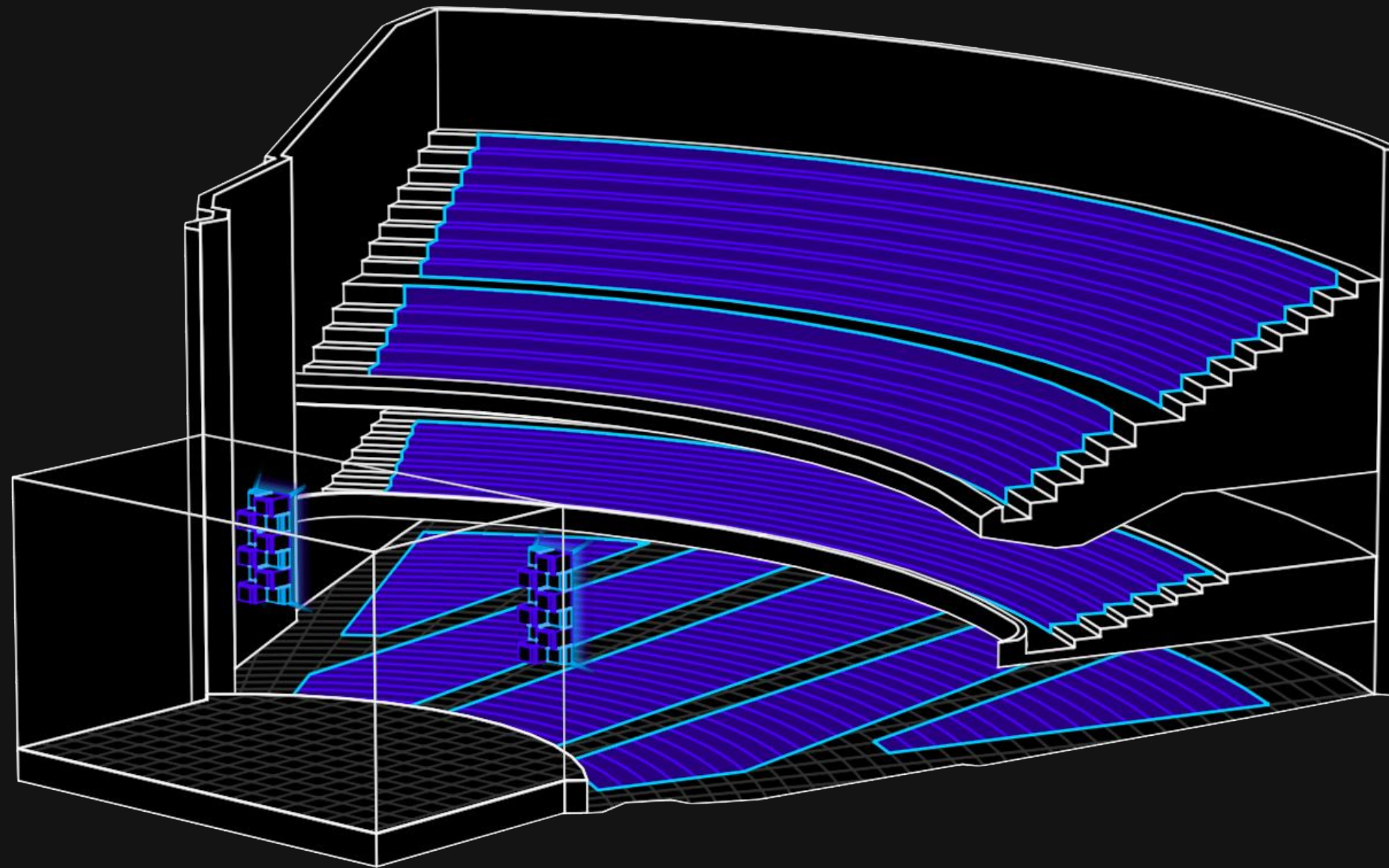
The venue

Beacon theater, NYC



The targeted zones

Beacon Theater, NYC



Reduce tier excitement

Beacon Theater, NYC

