

2.4 The Sound Dome project

The Sound Dome of the IMA (Fig. 3) is based on strategies that were inspired by the spherical auditorium of Osaka in 1970 (Frisius 1996:196). In this specific spatial arrangement, the listener is immersed in a dome-shaped loudspeaker installation which allows sounds to be placed throughout the entire area of the concert hall. The reticulated configuration of the loudspeakers enables the continuous movement of sound sources around the listener using the Vector Based Panning method (VBP) (Roads 1996: 459), irrespective of the size of the space and the number of loudspeakers (Fig. 4). The aforementioned software Zirkonium provides the interface between the flexible loudspeaker array and the unvarying sound choreography.

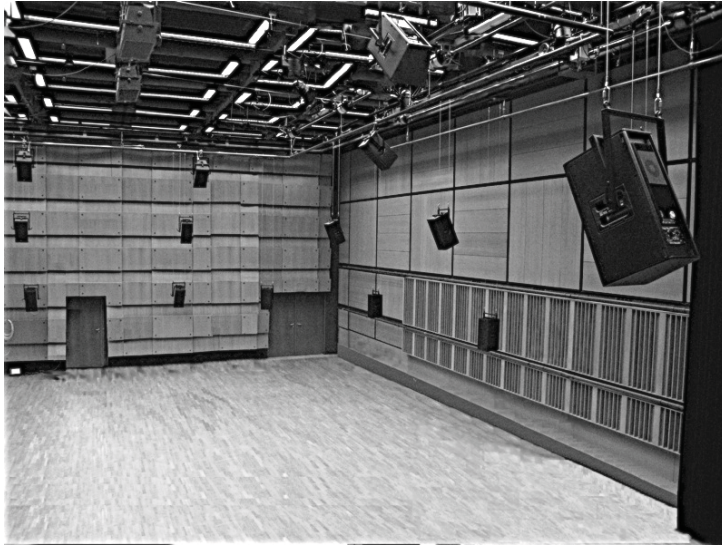


Fig. 3 The Sound Dome in the ZKM's Cube theater, with 47 loudspeakers and 4 subwoofers

Particular attention was paid to the development of the sound manipulation. Until now it was a challenge to control, for example, 50 or 60 loudspeakers together with 38 sound sources at once. A great deal of effort was put into the design of the interface, in order to make it intuitively understandable.

Thus, for the first time in the complex development process, Zirkonium represents an

instrument that can be used to flexibly perform spatial music, even with practicable resources and a small number of loudspeakers. Whereas composers were dependent on a proprietary format or a strictly set loudspeaker arrangement up to this point, it is now possible for them to adapt to the individual conditions of the performance space and to work on corresponding productions without being tied to the specific location. This system has already been used internationally, at concerts in Budapest, Munich, Cologne, Hamburg, Vilnius, Wiesbaden, and Karlsruhe. Moreover, an increasing number of concert halls possess multichannel sound systems that can be transformed into a sound dome environment with little effort. The existing loudspeaker installations can play back spatial sounds with little technical effort. An example can be seen in a setup at the Stuttgart State Opera, in which the loudspeakers were reconfigured into a sound dome for the occasion of a theater festival in less than one hour, without moving a single loudspeaker!

Zirkonium's basic conception and development took place from 2003 to 2008, and it is currently being further developed by the ZKM | Karlsruhe in conjunction with the University of Montreal. The goal is to motivate composers, developers, and institutions to get involved in its collective, open source development.



Fig. 4 The smaller 24-channel dome in the studio

New kinds of reception are also possible with such a multichannel environment. For example, orchestral music can be made into an immersive experience with the assistance of a sound dome. Instead of positioning the whole sound frontally, as is the case in the concert setting, the entire orchestra can virtually be placed above the audience. This makes it possible to step through the individual instrument groups while the work is being performed. The secondary lines suddenly become perceptible. The listener can move from the first to the second violins, to the woodwinds and brass, thus experiencing the music interactively and analytically. This new kind of listening leads to an «active» reception of music, which makes the construction of complex musical works perceptible in a new way. It is even possible to take it one step further and separate the polyphonic structures of Glenn Gould's interpretation of the Goldberg Variations, expressing it as sound architecture by placing and moving the motivic threads in space.

2.5 Research and development of interfaces controlling movement of sound

To the same extent that electronics have liberated sound from its physical requirements, thereby enabling the existence of sounds that are freed from their place of origin, technology has also broken down the physical connection between interface and sound generation. The specific physical properties of the piano keyboard result to some extent from the assignment of each of the strings and hammers to one individual key. Such physical requirements led to the development of a different interface for the harp, for example, than for the flute. Through the introduction of electronic pulse generation, these dependencies can be dissolved, and movements of sounds can be controlled using any kind of interface. If sounds are triggered by abstract control signals alone, performers and composers have the freedom to explore within the use of instruments and sounds.