


Shake, Rattle and Roll:

An attempt to create a
"spatially correct" Ambisonic mixdown
of a multi-miked organ concert

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Oh yeah, slides.

When was my talk again?

Shit.

A black spiral binding runs vertically along the left edge of the page.

What?

What?

- Olivier Messian, “Livre du Saint Sacrement”

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When?

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- On the three Klais organs of Cologne Cathedral

When?

- July 2009



So what?

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- The world's first

Wavefield Synthesis Live Transmission

from Cologne Cathedral to TU Berlin.

=> microphone concept targeted at virtual sources

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- => organs spatially separated with lots of height and ambience

- => microphone concept targeted at virtual sources
- => organs spatially separated with lots of height and ambience
- => hey, wouldn't this be a great showcase for Ambisonics?

Can we create a “spatially correct” ambisonic mixdown of a multi-miked organ concert?

Querhausorgel



Schwalbennestorgel



Tuba stops (one of 2 divisions)

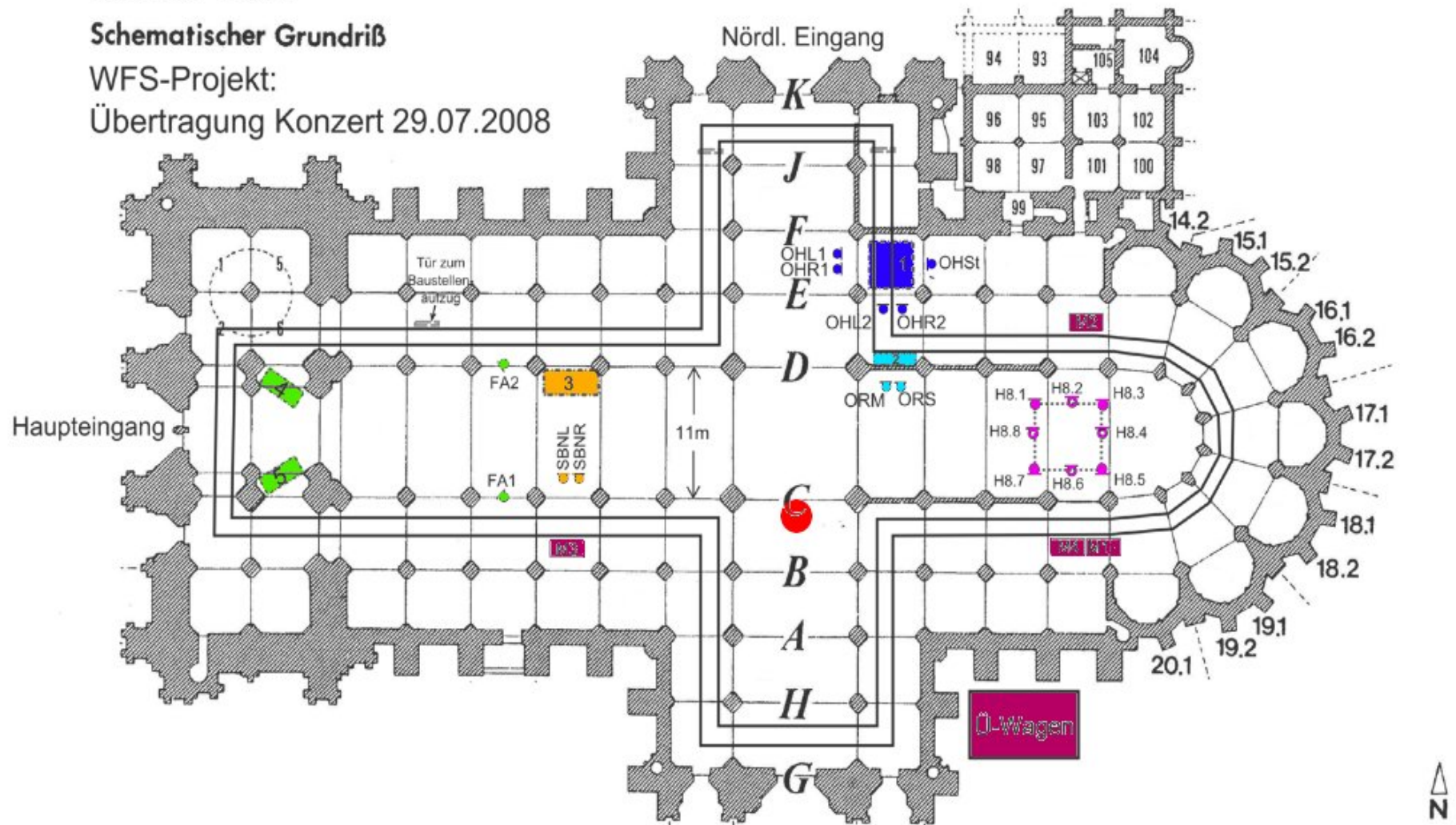


Kölner Dom

Schematischer Grundriß

WFS-Projekt:

Übertragung Konzert 29.07.2008



Legende:



Hauptorgel



Schwalbennest-
orgel



Rückpositiv
Hauptorgel



Fanfarenregister 1



Fanfarenregister 2



Stand: 29.07.2008

Microphone data – Livre du Saint Sacrement

Source	Microphone	Polar pattern	θ [deg]	d [m]	h [m]	ε [deg]	Δs_{Mic} [m]	Δt_{Mic} [s]	z [m]	$\Delta t_{Mixdown}$ [s]	Comments
H1 horiz.	Sennheiser MKH 800	Fig8	0	30.6	23	0	0	0.0000	38.28	0.1126	location not used
H2 vert.	Sennheiser MKH 800	Fig8	0	34.7	23	90	0	0.0000	41.63	0.1224	“
H3 horiz.	Sennheiser MKH 800	Fig8	0	38	23	0	0	0.0000	44.42	0.1306	“
H4 vert.	Sennheiser MKH 800	Fig8	0	37.3	23	90	0	0.0000	43.82	0.1289	“
H5 horiz.	Sennheiser MKH 800	Fig8	180	36.6	23	0	0	0.0000	43.23	0.1271	“
H6 vert.	Sennheiser MKH 800	Fig8	0	32.7	23	90	0	0.0000	39.98	0.1176	“
H7 horiz.	Sennheiser MKH 800	Fig8	180	28	23	0	0	0.0000	36.24	0.1066	“
H8 vert.	Sennheiser MKH 800	Fig8	0	28.7	23	90	0	0.0000	36.78	0.1082	“
Q1 L/R	2x Schoeps MK 5	Omni	-13	30	12	21.8	5	0.0147	32.31	0.0803	Pair angle 1°
Q2 L/R	2x Schoeps MK 5	Omni	-24	27.9	13	24.98	4	0.0118	30.78	0.0788	Pair angle 5°
Q3 M/S	Schoeps MK 5 / MK 8	Omni / Fig8	-34	20	6	16.7	3	0.0088	20.88	0.0526	S at -124°, no elev., -10dB
Q4	Schoeps MK 5	Omni	-28	32.6	12	20.21	3	0.0088	34.74	0.0933	
S L/R	2x Schoeps MK 21	Sub-Cardioid	62	30	27	41.99	11.3	0.0332	40.36	0.0855	Pair angle 2°
F1	Schoeps CCM41	Hyper-Cardioid	76	61.3	21	18.91	28.7	0.0844	64.8	0.1062	
F2	Schoeps CCM41	Hyper-Cardioid	88	59.3	21	19.5	28.7	0.0844	62.91	0.1006	
Announcer	Sennheiser MD 421	Cardioid	0	10	2	11.31	0.15	0.0004	10.2	0.0296	

θ : Azimuth angle, 0° is due north, positive is counter-clockwise (*measured*)

d: Distance on the floor between virtual listening spot and source (*measured*)

h: Height of source above listening spot (*estimated*)

ε : Elevation angle, 0° is on horizontal plane, 90° is zenith (*atan(h/d)*)

Δs_{Mic} : Distance from microphone to source (*estimated*)

Δt_{Mic} : Delay of sound due to microphone distance from source ($\Delta s_{Mic} / 340 \text{ m/s}$)

z: Total distance from listening spot to source ($\text{sqrt}(d^2+h^2)$)

$\Delta t_{Mixdown}$: Additional delay required during mixdown ($z / 340 \text{ m/s} - \Delta t_{Mic}$)

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=> azimuth + elevation: easy (just pan it!)

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- * early reflections

Panning considerations

- => azimuth + elevation: easy (just pan it!)
- => distance: ~~not so easy~~. friggin hard!
 - * level reduction ($\sim 1/r^2$ energy loss)
 - * high frequency damping
 - * wave front curvature (proximity effect)
 - * dry/reverb ratio
 - * early reflections

Problems

=> “false walls”

Problems

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=> wrong early reflections

Problems

=> “false walls”

=> wrong early reflections

=> missing correct reflections

Conclusion

It's fun.

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It leaves lots of space for Tonmeister creativity.

So: Ambisonics is a viable production format for
panned mono sources (i.e. everything on the market)

IMHO.

Thank you for your attention!

Any questions?