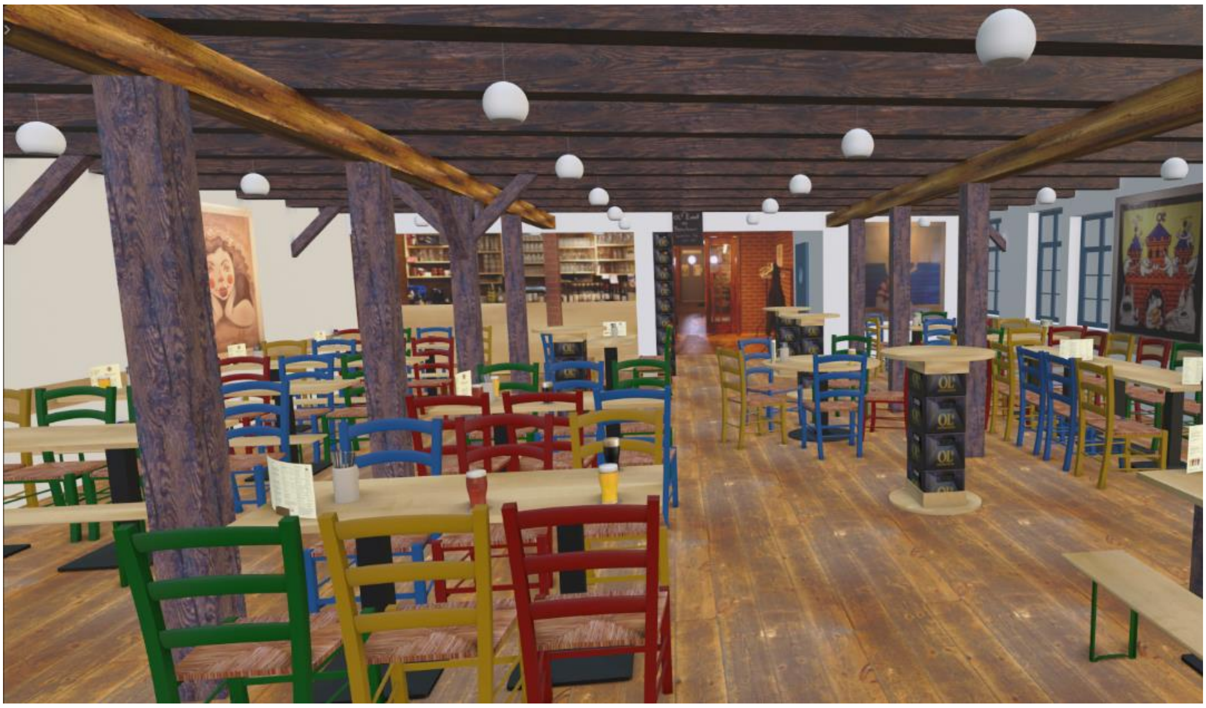
Pub environment

Created within the SFB 1330 “Hearing Acoustics: Perceptive Principles, Algorithms and Applications”



Authors: Maartje M. E. Hendrikse, Giso Grimm (g.grimm@uol.de)

Auditory Signal Processing Group
Department of Medical Physics and Acoustics and Cluster of Excellence Hearing4all
Carl von Ossietzky University Oldenburg

This work is licensed under the Creative Commons Attribution-NonCommercial 4.0 International License.

Version: 0.6
Date: 21 January 2022

I. DESCRIPTION

I.1 OVERVIEW

I.1.1 Location

The environment represents the acoustic and visual surroundings of OLs Brauhaus in Oldenburg, Rosenstraße 54. OLs Brauhaus is a pub associated with a local brewery. It was chosen because it represents a typical pub or restaurant and has a simple geometry that can be well approximated by a shoebox model, with only a few irregularities in the shape of the room or the interior prevailing. This is advantageous for both visual and acoustic modelling. Some photos of the OL's brewhouse can be seen in Figure 1. Currently, the location is not in operation as a pub, but is used for individual events and is still in its original condition.

I.1.2 Scenes

We consider two communication scenes in a pub. The first scene (Scene 1) represents a situation at a table where one person is having a conversation with four other people at the same table. The second scene (Scene 2) resembles a situation in which a waiter comes to the table to take the order. In addition, three alternative receiver positions are provided, resembling a person standing at three different positions in the pub. Impulse responses from many different source positions at adjacent tables have been recorded so that a noise background can be created.

In addition, impulse responses from the pub's PA system were recorded so that background music could be added to the acoustic scene.

1

Figure 1 – Photos of the OLs Brauhaus.

I.1.3 Floorplan

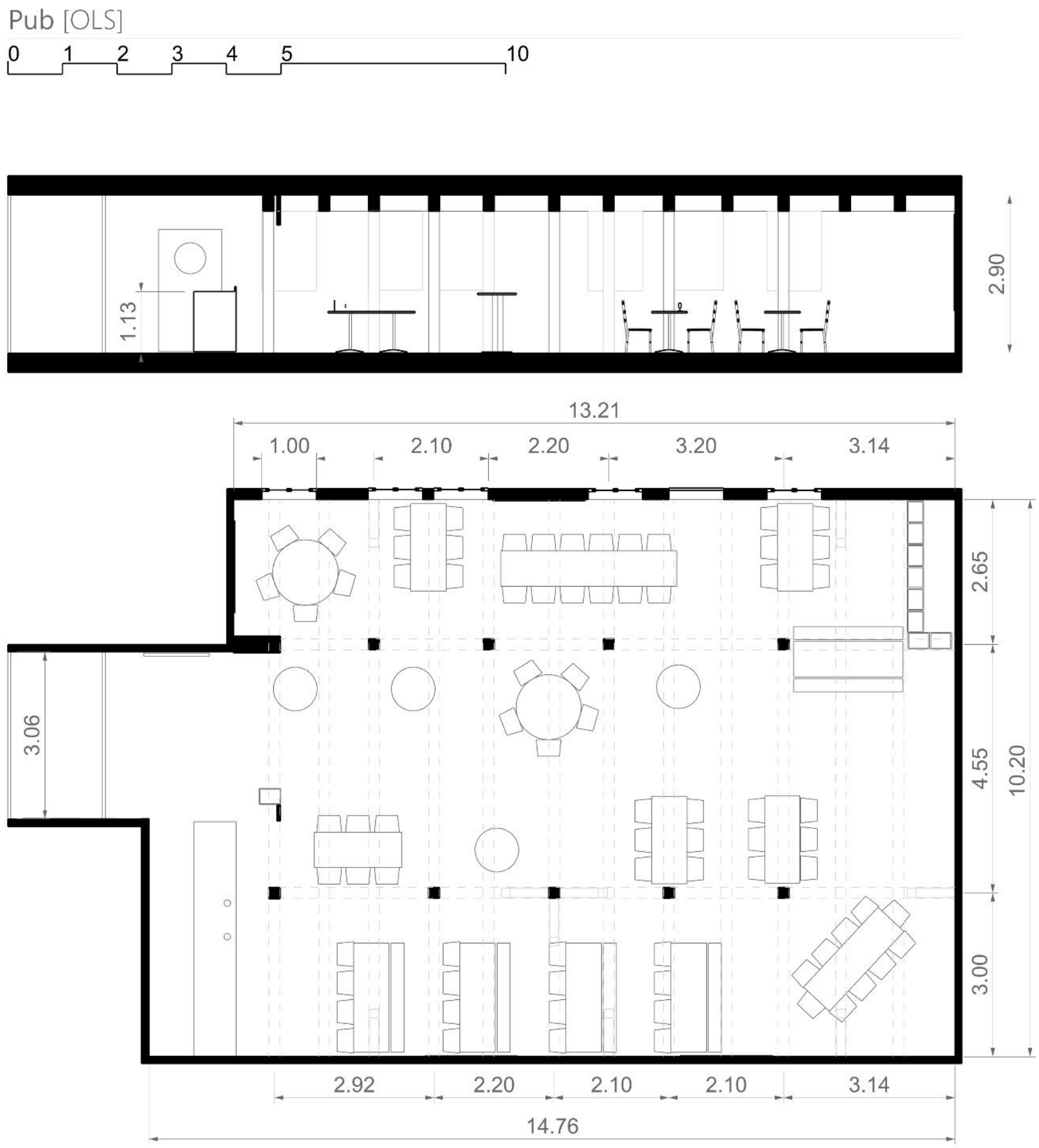


Figure 2 – Vertical (top half) and horizontal (lower half) cross-sections of the environment. The origin of the model [0,0,0] is at the bottom right corner of the section.

I.1.4 Volume

The volume of the whole environment is about 442 m^3.

I.1.5 Source-Receiver-Positions and Orientations

The positions and orientations of the source and receiver for which the impulse responses were measured are given in Figure 3. For both scenes, receiver position R1 represents the position of the listener at the table. For Scene 1, the impulse responses recorded from source positions T1-4 can be used to represent the conversation at the table. For Scene 2, the impulse response recorded from the source position labeled "Waiter" can be used to represent the target speech. The impulse responses recorded at the other positions N (neighboring table), S, and P can be used to create background noise. Positions N correspond largely to intelligible interfering speakers, while positions S and P are used more to generate unintelligible babble noise. The impulse responses recorded at the PA1 and PA2 positions can be used to add background music to the acoustic environment. The PA1 and PA2 impulse responses were not compensated for the frequency response of the JBL Control One loudspeakers, as this is a desired effect when simulating music reproduction in a pub. In addition, the room impulse response was measured by exciting the room with an omnidirectional source. The three additional listener positions were primarily for room characterization and can be used as alternative listener positions. The exact source and receiver positions are given in Section I.3.6.

In addition, a geometric arrangement was measured with only the HATS placed at receiver position R3 (C0-1 - C6-4). A Genelec 8030 loudspeaker was placed at distances of 1 m, 2 m, 4 m, and 8 m at an angle of 0° from the perspective of the receiver (aligned with the y-axis of the visual model) and at distances of 1 m, 2 m, 4 m at an angle of 60° to the right. These IRs were not aligned to an onset time matching to the provided acoustical model.

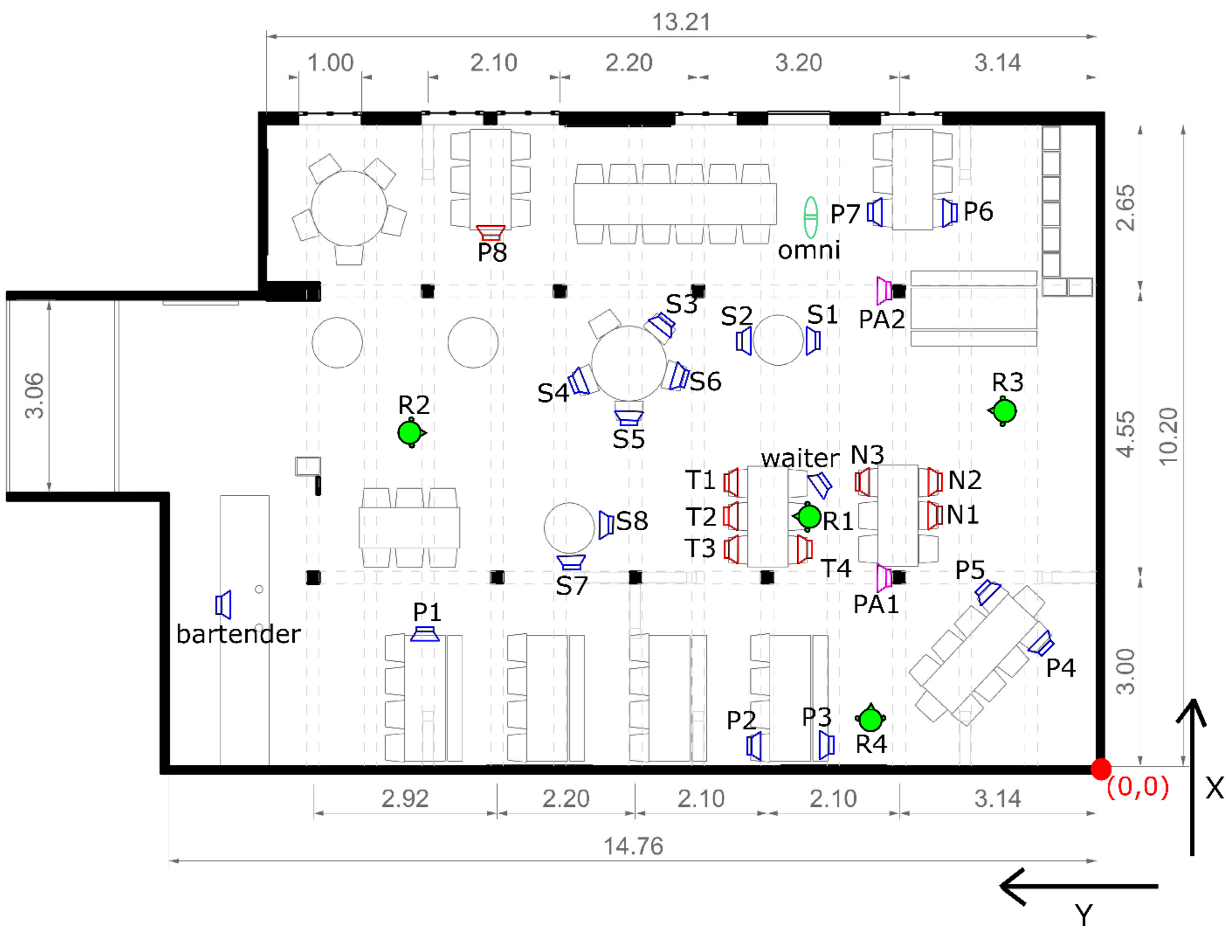


Figure 3 – Positions and orientations of receiver and sources indicated in floor plan. Source positions indicated in red are measured with Genelec 8030 loudspeakers, the source positions indicated in blue with Genelec 8020 loudspeakers. Exact positions are listed in tables 1 and 2.

I.2 ACOUSTICAL SPACE DESCRIPTION

I.2.1 Reverberation times

T30 and EDT were computed using the [ITA Toolbox], as a grand average over all impulse responses measured with an omnidirectional microphone at receiver positions R1-R4 and all loudspeaker positions.

The average reverberation time and EDT	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
T30 (s)	0.67	0.72	0.69	0.66	0.63	0.63	0,55
EDT (s)	0.70	0.81	0.72	0.64	0.75	0.57	0.52

I.2.2 Direct-to-reverberant energy ratio

Figure 4 shows the measurements of the direct-to-reverberant energy ratio (DRR) for different frequency octave bands, computed from the in-ear signals. In addition, it also shows the DRR values computed from the broadband speech-weighted signal such that the speech weighting was obtained from an OLNOISE stimulus [3]. Separation of direct and reverberant part was following [Bronkhorst1999]. The critical distance value for the broadband speech shaped sound is 1.66 m.

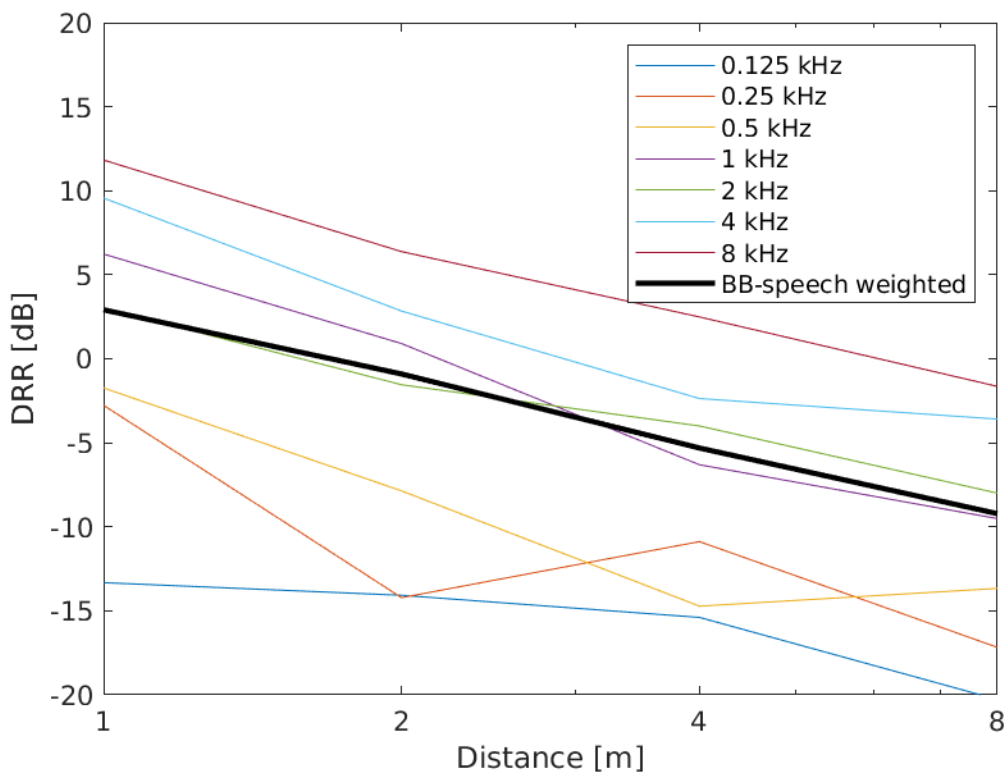


Figure 4 – Speech weighted direct-to-reverberant energy ratios (DRR) estimated in octave bands from the in-ear signals of an artificial head placed at receiver position R1. The sound source was at positions C0-1, C0-2, C0-4 and C0-8. The data were computed from the in-ear signals of the artificial head (mean of the left and right ear values).

I.3 MEASUREMENT DESCRIPTION

I.3.1 Measurement conditions

Date of Measurements: 06.10.2020

Air pressure: 995 hPa

Temperature: 19.9°C

Humidity: 47% rH

All signals were measured with a sampling frequency of 48 kHz.

During the recordings, there was construction work outside the building with heavy pile driving, resulting in SNR degradation on and thus truncation of some impulse responses.

I.3.2 Measurement source types

Omni directional sound source (OMNI)

B&K Type 4295

Directional sound source (Genelec)

Two different types of Genelec loudspeakers were used: type 8030 and type 8020.

Source positions are depicted in Fig. 1, where Genelec 8030 C (red) and 8020 D (blue) loudspeakers have been used to mimic a number of pub visitors. In addition to the plan, coordinates are listed in the additional table that is available as a separate file, where also the azimuthal orientation of the loudspeakers are listed. Additionally, an omnidirectional loudspeaker and the music playback system of the pub (HIFI-system with JBL Control One loudspeakers suspended from the ceiling) were used.

I.3.3 Measurement microphone types

Omnidirectional microphone

Neumann KM183, pointed towards the ceiling

Artificial head with BTE microphones

Data were recorded using the head-torso simulator (HATS) B&K Type 4128C with behind-the-ear (BTE) hearing aids (portable hearing lab headsets from BatAndCat Sound Labs). The HATS was equipped with in-ear microphones and Type 4158C (right) and Type 4159C (left) artificial pinnae, including Type 2669 preamplifiers, connected to a Type 12AA G.R.A.S. power module. The BTE hearing aids were connected to an adapter box using a custom-made micro-HDMI-to-sub-D adapter, which provides the power supply for the microphones. The adapter box has jack connectors that were connected to the audio interface used for recording.

Multi-microphone array

CoreSound TetraMic for First Order Ambisonics, converted to B-format using the TetraProc software and manufacturer-provided calibration files.

I.3.4 Excitation signal

An exponential sine sweep with a length of 2^18 samples was used (5.46s @ 48 kHz). The sweep started at 100 Hz and included 10 ms ramps at beginning and end. The sweep rate was adjusted in order to benefit low-frequency SNR. The gain was adjusted to avoid distortion with in the loudspeaker playback. The signal is provided in the folder /EXCITATION_SIGNAL.

I.3.5 File Naming Convention

The measured impulse responses for different sources-receiver configurations are stored in the repository according to the file naming convention depicted in Figure 4, to ease automated processing of the files.

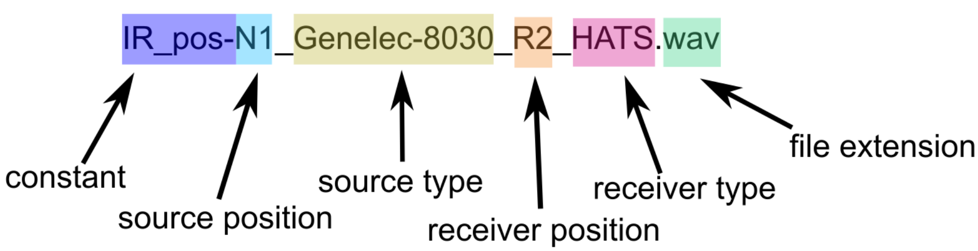


Figure 5 – File naming conventions for the repository.

I.3.6 Source – receiver positions

The positions of the receivers are specified in Table 1, the positions of the sound sources in Table 2 and Table 3. All receivers and sources were rotated only horizontally (pitch and roll were zero), with the exception of the PA1 and PA2 loudspeakers, which were tilted towards the floor. An exact measurement of pitch and roll was not possible for those speakers.

Table 1 – Exact receiver positions. Values are in metres and referenced to the origin of the model (see Figure 3). For orientation see Figure 3.

Receiver Positions	x	y	z	orientation rel. to x-Axis
R1	4.23	5.02	1.20	90
R2	6.02	11.17	1.55	270
R3	5.49	1.65	1.55	90
R4	0.97	3.84	1.20	2

Table 2 – Exact source positions. Both the position in Cartesian coordinates referenced to the origin of the model (see Figure 3), and the position in polar coordinates (azimuth and radius) relative to the receiver position R1 are indicated. Values are in metres, for loudspeaker orientation see Figure 3. The last column indicates whether the sources were occluded by beams or other object from R1 point of view.

Source	X [m]	Y [m]	Z [m]	Az [Deg]	r [m]	Occluded (y/n)
T1	4.72	5.98	1.20	333	1.08	n
T2	3.95	5.95	1.20	17	0.97	n
T3	3.36	5.94	1.20	43.5	1.27	n
T4	3.48	5.19	1.20	77	0.77	n
N1	4.07	2.93	1.20	175.5	2.1	n
N2	4.70	2.90	1.20	192.5	2.17	n
N3	4.78	3.42	1.20	199	1.69	n
S1	6.85	4.65	1.55	262	2.65	n
S2	6.86	5.63	1.55	283	2.7	n
S3	6.83	7.21	1.20	310	3.4	n
S4	5.90	7.98	1.20	330.5	3.4	n
S5	5.79	7.16	1.20	324	2.65	n
S6	6.27	6.79	1.20	311	2.7	n
S7	3.31	8.13	1.55	16.5	3.24	n
S8	3.50	7.85	1.55	14.5	2.92	n
P1	2.23	11.57	1.20	17	6.85	n
P2	0.28	5.12	1.20	88.5	3.95	n
P3	0.19	4.67	1.20	95	4.06	n
P4	1.89	1.55	1.20	146	4.18	y
P5	2.31	1.94	1.20	148	3.63	y

P6	8.84	2.41	1.20	240.5	5.3	y
P7	8.60	3.08	1.20	246	4.78	n
P8	8.05	10.11	1.20	323.1	6.37	y
PA1	3.00	3.14	2.70	-	-	-
PA2	7.55	3.14	2.70	-	-	-
waiter	4.93	4.57	1.55	237.5	0.83	n
bartender	3.03	14.11	1.55	7.5	9.17	n
omni	8.68	5.02	1.30	270	4.45	n

Table 3 – Exact source positions of the speakers for DRR measurements. Both the position in Cartesian coordinates referenced to the origin of the model (see Figure 3), and the position in polar coordinates (azimuth and radius) relative to the receiver position R3 are indicated. Values are in metres. The orientation of the sources was always towards the receiver R3.

Source	X [m]	Y [m]	Z [m]	Az [Deg]	r [m]
C0-1	5.49	2.65	1.55	0	1.00
C0-2	5.49	3.65	1.55	0	2.00
C0-4	5.49	5.65	1.55	0	4.00
C0-8	5.49	9.65	1.55	0	8.00
C6-1	5.99	2.52	1.55	60	1.00
C6-2	6.49	3.38	1.55	60	2.00
C6-4	7.49	5.11	1.55	60	4.00

I.3.7 Measurement equipment

Table 4 – List of measurement equipment.

Device	Manufacturer	Model
Omnidirectional measurement Class 1 microphone	Neumann	KM183

Tetrahedral microphone	Core Sound	TetraMic
Head- and Torso-Simulator	B&K	TYPE 4128C with artificial pinnae Type 4158C (right) and Type 4159C (left), preamplifiersType 2669
Pre-Amplifier GRAS	G.R.A.S.	Power Module Type 12AA
Hearing aid headsets	BatAndCat Sound Labs	Portable Hearing Laboratory BTE hearing aids with integrated preamplifiers
Adaptor box for "Hearpiece"	Electronics workshop of the Carl von Ossietzky university, version 3.0 (Jan 2019)	version 3.0 (Jan 2019)
Eigenmike	mhacoustics	
Eigenmike amplifier/preprocessor	mhacoustics	
D/A converter and MADI/ADAT converter	Ferrofish	A16 Mk-II
A/D + D/A converter	RME	ADI 8
A/D + D/A converter	Behringer	Ultragain Pro 8
Mic-Preamplifier and A/D	Presonus	DigiMax DP88
Soundcard	RME	HDSP MADI (PCIe)
Loudspeaker	Genelec	8020
Loudspeaker	Genelec	8030
Loudspeaker (omni)	B&K	Type 4295
Power amplifier	B&K	Type 2716-C

I.3.8 Averaging procedure

For the RIR-processing, an automatic noise rejection routine was used, rejecting measurements flawed by impulse-like noise based on a tempospectral cross-validation procedure. Up to eight measurements were averaged.

For the T60-estimates, combinations of the four receiver positions R1-R4 with an omnidirectional microphone and all loudspeaker positions were used.

I.4 ACKNOWLEDGMENTS

I.5 REFERENCES

[1] "openstreetmap.org," 2021. [Online]. Available: https://www.openstreetmap.org. [Accessed: 02-Mar-2021].

[ITA toolbox] https://www.ita-toolbox.org/publications/ITA-Toolbox_paper2017.pdf

Bronkhorst, A. W., & Houtgast, T. (1999). Auditory distance perception in rooms. Nature, 397(6719), 517–520. https://doi.org/10.1038/17374

II. TECHNICAL DATA FILE DESCRIPTION

II.1 ACOUSTIC MODEL

The acoustical model with the most relevant surfaces can be found in the file ACOUSTIC_MODEL/OLs_pub_acoustic.obj. Only surfaces oriented towards one of the receiver positions are included, and only for those surfaces matching the relevance criterion (see main paper for details). Three materials are used: The walls are made from plaster, the ceiling and the beams from rough wood, and the floor and tables from oiled/varnished wood.

II.2 VISUAL MODEL

The visual model can be found in the file VISUAL_MODEL/OLs_pub_visual.obj. The materials are defined based on pictures taken in the pub.

II.2.1 provided materials

File name	**Description**

MISC/OLs_pub.blend	The Blender file containing the acoustic and visual model in two separate scenes. This file was used to generate the OBJ files.
ACOUSTIC_MODEL/acoustic_properties.txt	Material definitions (acoustic properties)
ACOUSTIC_MODEL/OLs_pub_acoustic.obj	Acoustic model: simplified version of the visual model, contains all reflecting surfaces that are considered acoustically relevant
ACOUSTIC_MODEL/OLs_pub_acoustic.mtl	Material definitions
VISUAL_MODEL/*.jpg	Texture images
VISUAL_MODEL/OLs_pub_visual.obj	Visual model
VISUAL_MODEL/OLs_pub_visual.mtl	Material definitions

II.3 ATTRIBUTION

The work has been conducted in the Auditory Signal Processing group, led by Prof. Volker Hohmann, at the Carl von Ossietzky University Oldenburg. This group holds all license rights. Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) – Project-ID 352015383 – SFB 1330 - B1.

II.4 FILE NAMES FOR RECORDED IRS

II.4.1 omni

Receiver Position 1

IR_pos-N1_Genelec-8030_R1_omni1.wav
IR_pos-N2_Genelec-8030_R1_omni1.wav
IR_pos-N3_Genelec-8030_R1_omni1.wav
IR_pos-omni_B&K-omnisource_R1_omni1.wav
IR_pos-P1_Genelec-8020_R1_omni1.wav
IR_pos-P2_Genelec-8020_R1_omni1.wav
IR_pos-P3_Genelec-8020_R1_omni1.wav
IR_pos-P4_Genelec-8020_R1_omni1.wav
IR_pos-P5_Genelec-8020_R1_omni1.wav
IR_pos-P6_Genelec-8020_R1_omni1.wav
IR_pos-P7_Genelec-8020_R1_omni1.wav
IR_pos-P8_Genelec-8030_R1_omni1.wav

IR_pos-PA1_unknown-PA speaker_R1_omni1.wav
IR_pos-PA2_unknown-PA speaker_R1_omni1.wav
IR_pos-S1_Genelec-8020_R1_omni1.wav
IR_pos-S2_Genelec-8020_R1_omni1.wav
IR_pos-S3_Genelec-8020_R1_omni1.wav
IR_pos-S4_Genelec-8020_R1_omni1.wav
IR_pos-S5_Genelec-8020_R1_omni1.wav
IR_pos-S6_Genelec-8020_R1_omni1.wav
IR_pos-S8_Genelec-8020_R1_omni1.wav
IR_pos-T1_Genelec-8030_R1_omni1.wav
IR_pos-T2_Genelec-8030_R1_omni1.wav
IR_pos-T3_Genelec-8030_R1_omni1.wav
IR_pos-T4_Genelec-8030_R1_omni1.wav
IR_pos-tdr_Genelec-8020_R1_omni1.wav
IR_pos-wtr_Genelec-8020_R1_omni1.wav

Receiver Position 2

IR_pos-N1_Genelec-8030_R2_omni1.wav
IR_pos-N2_Genelec-8030_R2_omni1.wav
IR_pos-N3_Genelec-8030_R2_omni1.wav
IR_pos-omni_B&K-omnisource_R2_omni1.wav
IR_pos-P1_Genelec-8020_R2_omni1.wav
IR_pos-P2_Genelec-8020_R2_omni1.wav
IR_pos-P3_Genelec-8020_R2_omni1.wav
IR_pos-P4_Genelec-8020_R2_omni1.wav
IR_pos-P5_Genelec-8020_R2_omni1.wav
IR_pos-P6_Genelec-8020_R2_omni1.wav
IR_pos-P7_Genelec-8020_R2_omni1.wav
IR_pos-PA1_unknown-PA speaker_R2_omni1.wav
IR_pos-PA2_unknown-PA speaker_R2_omni1.wav
IR_pos-S1_Genelec-8020_R2_omni1.wav
IR_pos-S2_Genelec-8020_R2_omni1.wav
IR_pos-S3_Genelec-8020_R2_omni1.wav
IR_pos-S4_Genelec-8020_R2_omni1.wav
IR_pos-S5_Genelec-8020_R2_omni1.wav
IR_pos-S6_Genelec-8020_R2_omni1.wav
IR_pos-S7_Genelec-8020_R2_omni1.wav
IR_pos-S8_Genelec-8020_R2_omni1.wav
IR_pos-T1_Genelec-8030_R2_omni1.wav
IR_pos-T2_Genelec-8030_R2_omni1.wav
IR_pos-T3_Genelec-8030_R2_omni1.wav
IR_pos-T4_Genelec-8030_R2_omni1.wav
IR_pos-tdr_Genelec-8020_R2_omni1.wav
IR_pos-wtr_Genelec-8020_R2_omni1.

Receiver Position 3

IR_pos-N1_Genelec-8030_R3_omni1.wav
IR_pos-N2_Genelec-8030_R3_omni1.wav
IR_pos-N3_Genelec-8030_R3_omni1.wav
IR_pos-P1_Genelec-8020_R3_omni1.wav
IR_pos-P2_Genelec-8020_R3_omni1.wav
IR_pos-P3_Genelec-8020_R3_omni1.wav
IR_pos-P4_Genelec-8020_R3_omni1.wav
IR_pos-P5_Genelec-8020_R3_omni1.wav
IR_pos-P7_Genelec-8020_R3_omni1.wav
IR_pos-P8_Genelec-8030_R3_omni1.wav
IR_pos-PA1_unknown-PA speaker_R3_omni1.wav
IR_pos-PA2_unknown-PA speaker_R3_omni1.wav
IR_pos-S1_Genelec-8020_R3_omni1.wav
IR_pos-S2_Genelec-8020_R3_omni1.wav
IR_pos-S3_Genelec-8020_R3_omni1.wav
IR_pos-S4_Genelec-8020_R3_omni1.wav
IR_pos-S5_Genelec-8020_R3_omni1.wav
IR_pos-S6_Genelec-8020_R3_omni1.wav
IR_pos-S7_Genelec-8020_R3_omni1.wav
IR_pos-S8_Genelec-8020_R3_omni1.wav
IR_pos-T1_Genelec-8030_R3_omni1.wav
IR_pos-T2_Genelec-8030_R3_omni1.wav
IR_pos-T3_Genelec-8030_R3_omni1.wav
IR_pos-T4_Genelec-8030_R3_omni1.wav
IR_pos-tdr_Genelec-8020_R3_omni1.wav
IR_pos-wtr_Genelec-8020_R3_omni1.wav

Receiver Position 4

IR_pos-N1_Genelec-8030_R4_omni1.wav
IR_pos-N2_Genelec-8030_R4_omni1.wav
IR_pos-N3_Genelec-8030_R4_omni1.wav
IR_pos-omni_B&K-omnisource_R4_omni1.wav
IR_pos-P1_Genelec-8020_R4_omni1.wav
IR_pos-P2_Genelec-8020_R4_omni1.wav
IR_pos-P3_Genelec-8020_R4_omni1.wav
IR_pos-P4_Genelec-8020_R4_omni1.wav
IR_pos-P5_Genelec-8020_R4_omni1.wav
IR_pos-P6_Genelec-8020_R4_omni1.wav
IR_pos-P7_Genelec-8020_R4_omni1.wav
IR_pos-P8_Genelec-8030_R4_omni1.wav
IR_pos-PA1_unknown-PA speaker_R4_omni1.wav
IR_pos-PA2_unknown-PA speaker_R4_omni1.wav
IR_pos-S1_Genelec-8020_R4_omni1.wav
IR_pos-S2_Genelec-8020_R4_omni1.wav
IR_pos-S3_Genelec-8020_R4_omni1.wav
IR_pos-S4_Genelec-8020_R4_omni1.wav
IR_pos-S5_Genelec-8020_R4_omni1.wav

IR_pos-S7_Genelec-8020_R4_omni1.wav
IR_pos-S8_Genelec-8020_R4_omni1.wav
IR_pos-T1_Genelec-8030_R4_omni1.wav
IR_pos-T2_Genelec-8030_R4_omni1.wav
IR_pos-T3_Genelec-8030_R4_omni1.wav
IR_pos-T4_Genelec-8030_R4_omni1.wav
IR_pos-tdr_Genelec-8020_R4_omni1.wav
IR_pos-wtr_Genelec-8020_R4_omni1.wav

II.4.2 hats

Receiver Position 1

IR_pos-C0-1_Genelec-8030_R1_HATS.wav
IR_pos-C0-2_Genelec-8030_R1_HATS.wav
IR_pos-C0-4_Genelec-8030_R1_HATS.wav
IR_pos-C0-8_Genelec-8030_R1_HATS.wav
IR_pos-C6-1_Genelec-8030_R1_HATS.wav
IR_pos-C6-2_Genelec-8030_R1_HATS.wav
IR_pos-C6-4_Genelec-8030_R1_HATS.wav
IR_pos-N1_Genelec-8030_R1_HATS.wav
IR_pos-N2_Genelec-8030_R1_HATS.wav
IR_pos-N3_Genelec-8030_R1_HATS.wav
IR_pos-omni_B&K-omnisource_R1_HATS.wav
IR_pos-P1_Genelec-8020_R1_HATS.wav
IR_pos-P2_Genelec-8020_R1_HATS.wav
IR_pos-P3_Genelec-8020_R1_HATS.wav
IR_pos-P4_Genelec-8020_R1_HATS.wav
IR_pos-P5_Genelec-8020_R1_HATS.wav
IR_pos-P6_Genelec-8020_R1_HATS.wav
IR_pos-P7_Genelec-8020_R1_HATS.wav
IR_pos-P8_Genelec-8030_R1_HATS.wav
IR_pos-PA1_unknown-PA speaker_R1_HATS.wav
IR_pos-PA2_unknown-PA speaker_R1_HATS.wav
IR_pos-S1_Genelec-8020_R1_HATS.wav
IR_pos-S2_Genelec-8020_R1_HATS.wav
IR_pos-S3_Genelec-8020_R1_HATS.wav
IR_pos-S4_Genelec-8020_R1_HATS.wav
IR_pos-S5_Genelec-8020_R1_HATS.wav
IR_pos-S6_Genelec-8020_R1_HATS.wav
IR_pos-S7_Genelec-8020_R1_HATS.wav
IR_pos-S8_Genelec-8020_R1_HATS.wav
IR_pos-T1_Genelec-8030_R1_HATS.wav
IR_pos-T2_Genelec-8030_R1_HATS.wav
IR_pos-T3_Genelec-8030_R1_HATS.wav
IR_pos-T4_Genelec-8030_R1_HATS.wav
IR_pos-tdr_Genelec-8020_R1_HATS.wav
IR_pos-wtr_Genelec-8020_R1_HATS.wav

Receiver Position 2

IR_pos-N1_Genelec-8030_R2_HATS.wav
IR_pos-N2_Genelec-8030_R2_HATS.wav
IR_pos-N3_Genelec-8030_R2_HATS.wav
IR_pos-omni_B&K-omnisource_R2_HATS.wav
IR_pos-P1_Genelec-8020_R2_HATS.wav
IR_pos-P2_Genelec-8020_R2_HATS.wav
IR_pos-P3_Genelec-8020_R2_HATS.wav
IR_pos-P4_Genelec-8020_R2_HATS.wav
IR_pos-P5_Genelec-8020_R2_HATS.wav
IR_pos-P6_Genelec-8020_R2_HATS.wav
IR_pos-P7_Genelec-8020_R2_HATS.wav
IR_pos-P8_Genelec-8030_R2_HATS.wav
IR_pos-PA1_unknown-PA speaker_R2_HATS.wav
IR_pos-PA2_unknown-PA speaker_R2_HATS.wav
IR_pos-S1_Genelec-8020_R2_HATS.wav
IR_pos-S2_Genelec-8020_R2_HATS.wav
IR_pos-S3_Genelec-8020_R2_HATS.wav
IR_pos-S4_Genelec-8020_R2_HATS.wav
IR_pos-S5_Genelec-8020_R2_HATS.wav
IR_pos-S6_Genelec-8020_R2_HATS.wav
IR_pos-S7_Genelec-8020_R2_HATS.wav
IR_pos-S8_Genelec-8020_R2_HATS.wav
IR_pos-T1_Genelec-8030_R2_HATS.wav
IR_pos-T2_Genelec-8030_R2_HATS.wav
IR_pos-T3_Genelec-8030_R2_HATS.wav
IR_pos-T4_Genelec-8030_R2_HATS.wav
IR_pos-tdr_Genelec-8020_R2_HATS.wav
IR_pos-wtr_Genelec-8020_R2_HATS.wav

Receiver Position 3

IR_pos-N1_Genelec-8030_R3_HATS.wav
IR_pos-N2_Genelec-8030_R3_HATS.wav
IR_pos-N3_Genelec-8030_R3_HATS.wav
IR_pos-omni_B&K-omnisource_R3_HATS.wav
IR_pos-P1_Genelec-8020_R3_HATS.wav
IR_pos-P2_Genelec-8020_R3_HATS.wav
IR_pos-P3_Genelec-8020_R3_HATS.wav
IR_pos-P4_Genelec-8020_R3_HATS.wav
IR_pos-P5_Genelec-8020_R3_HATS.wav
IR_pos-P6_Genelec-8020_R3_HATS.wav
IR_pos-P7_Genelec-8020_R3_HATS.wav
IR_pos-P8_Genelec-8030_R3_HATS.wav
IR_pos-PA1_unknown-PA speaker_R3_HATS.wav

IR_pos-PA2_unknown-PA speaker_R3_HATS.wav
IR_pos-S1_Genelec-8020_R3_HATS.wav
IR_pos-S2_Genelec-8020_R3_HATS.wav
IR_pos-S3_Genelec-8020_R3_HATS.wav
IR_pos-S4_Genelec-8020_R3_HATS.wav
IR_pos-S5_Genelec-8020_R3_HATS.wav
IR_pos-S6_Genelec-8020_R3_HATS.wav
IR_pos-S7_Genelec-8020_R3_HATS.wav
IR_pos-S8_Genelec-8020_R3_HATS.wav
IR_pos-T1_Genelec-8030_R3_HATS.wav
IR_pos-T2_Genelec-8030_R3_HATS.wav
IR_pos-T3_Genelec-8030_R3_HATS.wav
IR_pos-T4_Genelec-8030_R3_HATS.wav
IR_pos-tdr_Genelec-8020_R3_HATS.wav
IR_pos-wtr_Genelec-8020_R3_HATS.wav

Receiver Position 4

IR_pos-N1_Genelec-8030_R4_HATS.wav
IR_pos-N2_Genelec-8030_R4_HATS.wav
IR_pos-N3_Genelec-8030_R4_HATS.wav
IR_pos-omni_B&K-omnisource_R4_HATS.wav
IR_pos-P1_Genelec-8020_R4_HATS.wav
IR_pos-P2_Genelec-8020_R4_HATS.wav
IR_pos-P3_Genelec-8020_R4_HATS.wav
IR_pos-P4_Genelec-8020_R4_HATS.wav
IR_pos-P5_Genelec-8020_R4_HATS.wav
IR_pos-P6_Genelec-8020_R4_HATS.wav
IR_pos-P7_Genelec-8020_R4_HATS.wav
IR_pos-P8_Genelec-8030_R4_HATS.wav
IR_pos-PA1_unknown-PA speaker_R4_HATS.wav
IR_pos-PA2_unknown-PA speaker_R4_HATS.wav
IR_pos-S1_Genelec-8020_R4_HATS.wav
IR_pos-S2_Genelec-8020_R4_HATS.wav
IR_pos-S3_Genelec-8020_R4_HATS.wav
IR_pos-S4_Genelec-8020_R4_HATS.wav
IR_pos-S5_Genelec-8020_R4_HATS.wav
IR_pos-S6_Genelec-8020_R4_HATS.wav
IR_pos-S7_Genelec-8020_R4_HATS.wav
IR_pos-S8_Genelec-8020_R4_HATS.wav
IR_pos-T1_Genelec-8030_R4_HATS.wav
IR_pos-T2_Genelec-8030_R4_HATS.wav
IR_pos-T3_Genelec-8030_R4_HATS.wav
IR_pos-T4_Genelec-8030_R4_HATS.wav
IR_pos-tdr_Genelec-8020_R4_HATS.wav
IR_pos-wtr_Genelec-8020_R4_HATS.wav

II.4.3 FOA

All files are available in A-format (uncalibrated tetramic signals, .wav) and B-format with FuMa normalization and wxyz channelorder (.amb).

Receiver Position 1

IR_pos-N1_Genelec-8030_R1_FOA.wav
IR_pos-N2_Genelec-8030_R1_FOA.wav
IR_pos-N3_Genelec-8030_R1_FOA.wav
IR_pos-omni_B&K-omnisource_R1_FOA.wav
IR_pos-P1_Genelec-8020_R1_FOA.wav
IR_pos-P2_Genelec-8020_R1_FOA.wav
IR_pos-P3_Genelec-8020_R1_FOA.wav
IR_pos-P4_Genelec-8020_R1_FOA.wav
IR_pos-P5_Genelec-8020_R1_FOA.wav
IR_pos-P6_Genelec-8020_R1_FOA.wav
IR_pos-P7_Genelec-8020_R1_FOA.wav
IR_pos-P8_Genelec-8030_R1_FOA.wav
IR_pos-PA1_unknown-PA speaker_R1_FOA.wav
IR_pos-PA2_unknown-PA speaker_R1_FOA.wav
IR_pos-S1_Genelec-8020_R1_FOA.wav
IR_pos-S2_Genelec-8020_R1_FOA.wav
IR_pos-S3_Genelec-8020_R1_FOA.wav
IR_pos-S4_Genelec-8020_R1_FOA.wav
IR_pos-S5_Genelec-8020_R1_FOA.wav
IR_pos-S6_Genelec-8020_R1_FOA.wav
IR_pos-S7_Genelec-8020_R1_FOA.wav
IR_pos-S8_Genelec-8020_R1_FOA.wav
IR_pos-T1_Genelec-8030_R1_FOA.wav
IR_pos-T2_Genelec-8030_R1_FOA.wav
IR_pos-T3_Genelec-8030_R1_FOA.wav
IR_pos-T4_Genelec-8030_R1_FOA.wav
IR_pos-tdr_Genelec-8020_R1_FOA.wav
IR_pos-wtr_Genelec-8020_R1_FOA.wav

Receiver Position 2

IR_pos-N1_Genelec-8030_R2_FOA.wav
IR_pos-N2_Genelec-8030_R2_FOA.wav
IR_pos-N3_Genelec-8030_R2_FOA.wav
IR_pos-omni_B&K-omnisource_R2_FOA.wav
IR_pos-P1_Genelec-8020_R2_FOA.wav
IR_pos-P2_Genelec-8020_R2_FOA.wav
IR_pos-P3_Genelec-8020_R2_FOA.wav
IR_pos-P4_Genelec-8020_R2_FOA.wav
IR_pos-P5_Genelec-8020_R2_FOA.wav
IR_pos-P6_Genelec-8020_R2_FOA.wav

IR_pos-P7_Genelec-8020_R2_FOA.wav
IR_pos-P8_Genelec-8030_R2_FOA.wav
IR_pos-PA1_unknown-PA speaker_R2_FOA.wav
IR_pos-PA2_unknown-PA speaker_R2_FOA.wav
IR_pos-S1_Genelec-8020_R2_FOA.wav
IR_pos-S2_Genelec-8020_R2_FOA.wav
IR_pos-S3_Genelec-8020_R2_FOA.wav
IR_pos-S4_Genelec-8020_R2_FOA.wav
IR_pos-S5_Genelec-8020_R2_FOA.wav
IR_pos-S6_Genelec-8020_R2_FOA.wav
IR_pos-S7_Genelec-8020_R2_FOA.wav
IR_pos-S8_Genelec-8020_R2_FOA.wav
IR_pos-T1_Genelec-8030_R2_FOA.wav
IR_pos-T2_Genelec-8030_R2_FOA.wav
IR_pos-T3_Genelec-8030_R2_FOA.wav
IR_pos-T4_Genelec-8030_R2_FOA.wav
IR_pos-tdr_Genelec-8020_R2_FOA.wav
IR_pos-wtr_Genelec-8020_R2_FOA.wav

Receiver Position 3

IR_pos-N1_Genelec-8030_R3_FOA.wav
IR_pos-N2_Genelec-8030_R3_FOA.wav
IR_pos-N3_Genelec-8030_R3_FOA.wav
IR_pos-omni_B&K-omnisource_R3_FOA.wav
IR_pos-P1_Genelec-8020_R3_FOA.wav
IR_pos-P2_Genelec-8020_R3_FOA.wav
IR_pos-P3_Genelec-8020_R3_FOA.wav
IR_pos-P4_Genelec-8020_R3_FOA.wav
IR_pos-P5_Genelec-8020_R3_FOA.wav
IR_pos-P6_Genelec-8020_R3_FOA.wav
IR_pos-P7_Genelec-8020_R3_FOA.wav
IR_pos-P8_Genelec-8030_R3_FOA.wav
IR_pos-PA1_unknown-PA speaker_R3_FOA.wav
IR_pos-PA2_unknown-PA speaker_R3_FOA.wav
IR_pos-S1_Genelec-8020_R3_FOA.wav
IR_pos-S2_Genelec-8020_R3_FOA.wav
IR_pos-S3_Genelec-8020_R3_FOA.wav
IR_pos-S4_Genelec-8020_R3_FOA.wav
IR_pos-S5_Genelec-8020_R3_FOA.wav
IR_pos-S6_Genelec-8020_R3_FOA.wav
IR_pos-S7_Genelec-8020_R3_FOA.wav
IR_pos-S8_Genelec-8020_R3_FOA.wav
IR_pos-T1_Genelec-8030_R3_FOA.wav
IR_pos-T2_Genelec-8030_R3_FOA.wav
IR_pos-T3_Genelec-8030_R3_FOA.wav
IR_pos-T4_Genelec-8030_R3_FOA.wav
IR_pos-tdr_Genelec-8020_R3_FOA.wav

IR_pos-wtr_Genelec-8020_R3_FOA.wav

Receiver Position 4

IR_pos-N1_Genelec-8030_R4_FOA.wav
IR_pos-N2_Genelec-8030_R4_FOA.wav
IR_pos-N3_Genelec-8030_R4_FOA.wav
IR_pos-omni_B&K-omnisource_R4_FOA.wav
IR_pos-P1_Genelec-8020_R4_FOA.wav
IR_pos-P2_Genelec-8020_R4_FOA.wav
IR_pos-P3_Genelec-8020_R4_FOA.wav
IR_pos-P4_Genelec-8020_R4_FOA.wav
IR_pos-P5_Genelec-8020_R4_FOA.wav
IR_pos-P6_Genelec-8020_R4_FOA.wav
IR_pos-P7_Genelec-8020_R4_FOA.wav
IR_pos-P8_Genelec-8030_R4_FOA.wav
IR_pos-PA1_unknown-PA speaker_R4_FOA.wav
IR_pos-PA2_unknown-PA speaker_R4_FOA.wav
IR_pos-S1_Genelec-8020_R4_FOA.wav
IR_pos-S2_Genelec-8020_R4_FOA.wav
IR_pos-S3_Genelec-8020_R4_FOA.wav
IR_pos-S4_Genelec-8020_R4_FOA.wav
IR_pos-S5_Genelec-8020_R4_FOA.wav
IR_pos-S6_Genelec-8020_R4_FOA.wav
IR_pos-S7_Genelec-8020_R4_FOA.wav
IR_pos-S8_Genelec-8020_R4_FOA.wav
IR_pos-T1_Genelec-8030_R4_FOA.wav
IR_pos-T2_Genelec-8030_R4_FOA.wav
IR_pos-T3_Genelec-8030_R4_FOA.wav
IR_pos-T4_Genelec-8030_R4_FOA.wav
IR_pos-tdr_Genelec-8020_R4_FOA.wav
IR_pos-wtr_Genelec-8020_R4_FOA.wav