HISTORY AND PEOPLE

History

1972	Kommission für Schallforschung Director: Walter Graf
1982	Director: Othmar Wessely
1994	Forschungsstelle Schallforschung Director: Werner A. Deutsch
2000	**Institut für Schallforschung** (Acoustics Research Institute) Director: Werner A. Deutsch
2012	Director: Peter Balazs

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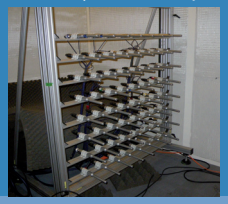
Speech Analysis

Microphone Array



Spatial Audio

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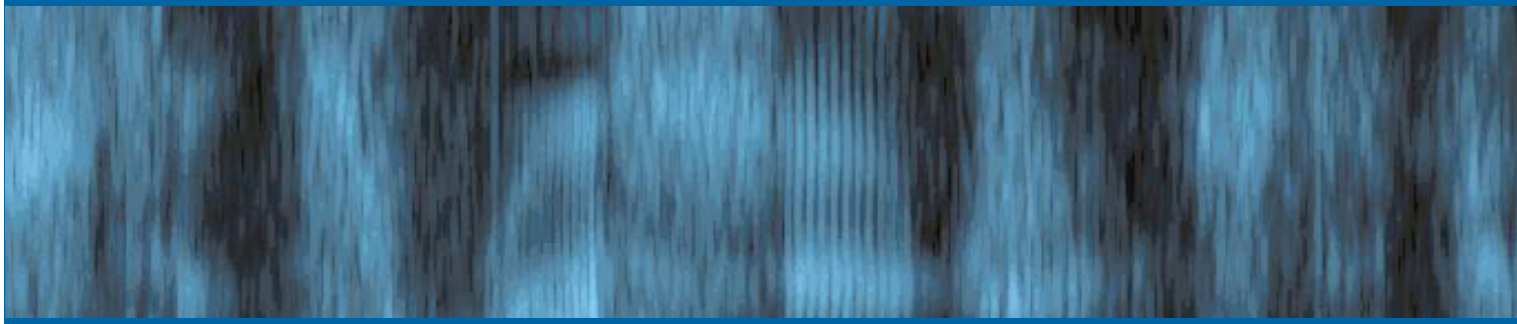

Acoustics Research Institute

Institut für Schallforschung

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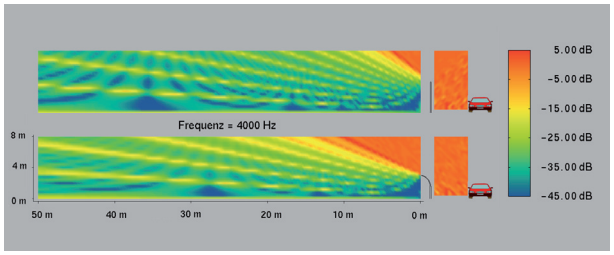
Acoustics Research Institute (ARI)

Acoustics is the science of mechanical waves in gases, liquids, and solids. It deals with the interaction between sounds, objects, humans and animals, including sound perception and production.

The Acoustics Research Institute (ARI) is committed to application-oriented fundamental research in the field of acoustics. Addressing the research demands, ARI consists of four groups working in close collaboration. Each of the groups is active in both fundamental and applied research, aiming for scientific excellency particularly in interdisciplinary projects.

Immision measurement of a train with a 64-channel microphone array.

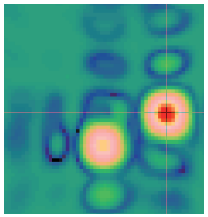
Our research results are implemented in various software systems and published in top-ranked journals, thus reflecting the quality of our research. We cooperate with academic and industrial partners. We are in the unique position in Austria to offer comprehensive education in many fields of acoustics.



Numerical simulation of the insertion loss of noise barriers.
Top: 4-m high straight vertical. Bottom: 3-m high outward bended.

Physical & Computational Acoustics

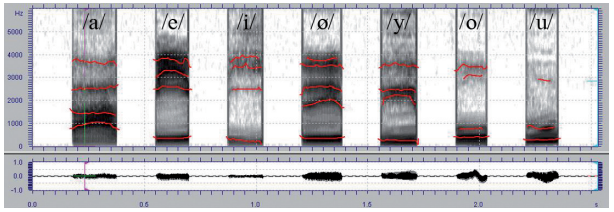
We work on the development and application of computational methods to describe physical interactions between sounds and objects. Our research includes models of the dynamics of structures, sound fields, and vibrations with applications in environmental noise control, automotive audio, auditory perception, and speech production.



Emission localization of sound sources radiated from the surface of the wheel of a train vehicle.

Acoustic Phonetics

We analyze and interpret speech with respect to their production, perception, and social and regional attribution. Language varieties are described by means of acoustic speech parameters and integrated into a phonological theory. Our results find application in speech technology, clinical phonetics, and speaker recognition.



Spectrogram and formant shapes of selected Austrian-German vowels.

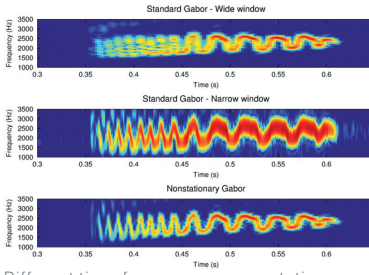
Software & HRTF Database

A famous example of our development is S_TOOLS-STx. Focused on signal processing, it was designed to cope with large sound databases and provides capability to process multichannel audio signals in real time.

Further software developments are ExpSuite, AMToolbox and LTFAT. Our publicly available HRTF database provides data of over 80 listeners.

Mathematics and Signal Processing in Acoustics

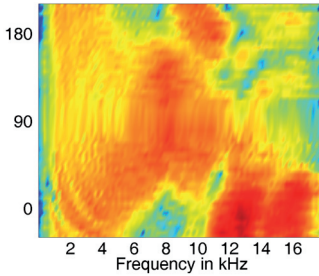
We develop innovative mathematical methods for various applications by connecting frame and operator theory with acoustics. For example, our results allow to design frames with variable time-frequency resolution finding application in the development of a new class of models for auditory perception.



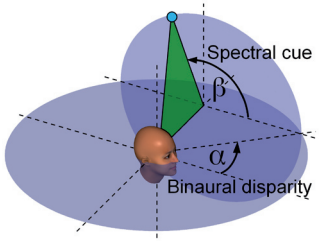
Different time-frequency representations of a bird song.

Psychoacoustics & Experimental Audiology

We study auditory perception in acoustic (normal and impaired) and electric hearing. While focusing on spatial hearing, we investigate not only sound localization and auditory scene analysis, but also time-frequency masking, spectral profiling, and speech perception in noise.



Head-related transfer functions (HRTFs) in the median plane.



Horizontal-polar coordinate system for sound localization in humans.

Our equipment allows us to test cochlear-implant listeners via bilateral direct stimulation, to measure the listener-specific filtering effects of head and pinna, and to perform studies in terms of binaural virtual acoustics.