

Lecture  
**Music Processing Analysis (MPA)**

**Introduction**

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**Meinard Müller**



- Mathematics (Diplom/Master)  
Computer Science (PhD)  
Information Retrieval (Habilitation)  
**Bonn University**
- Combinatorics (Postdoc)  
**Keio University, Japan**
- Senior Researcher  
**Max-Planck Institute, Saarland**
- Professor: Semantic Audio Processing  
**Erlangen-Nürnberg University**



**Group Members**

- Christof Weiß
- Frank Zalkow
- Michael Krause
- Sebastian Rosenzweig
- Hendrik Schreiber



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**Where are we?**

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**Fraunhofer-Gesellschaft**

- Europe's largest organization for applied research
- 18,000 employees worldwide, total budget: 1.5 billion €
- 60 institutes covering a broad range of research areas

**Fraunhofer Institute for Integrated Circuits IIS**

- Largest Fraunhofer institute
- Staff >700 people
- MP3



## Where are we?



Friedrich-Alexander Universität Erlangen-Nürnberg (FAU)

- One of Germany's largest universities
- More than 35,000 students



Collaboration between FAU and Fraunhofer IIS

- Roots of "MP3" audio compression scheme
- Research on audio coding in Erlangen since 1981

## International Audio Laboratories Erlangen

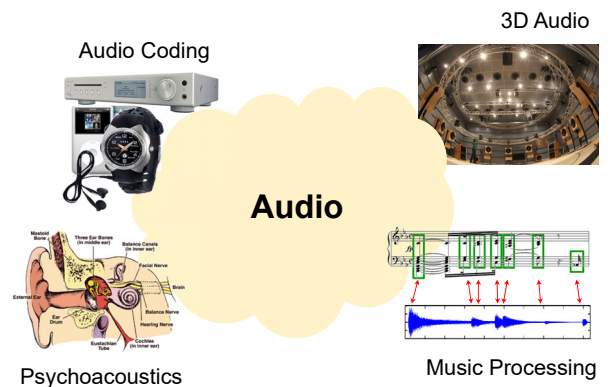


**AUDIO  
LABS**

## International Audio Laboratories Erlangen

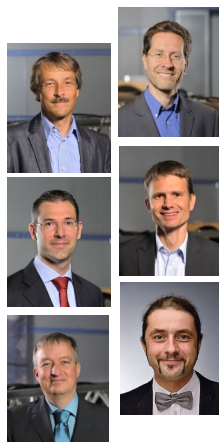
**Audio**

## International Audio Laboratories Erlangen



## AudioLabs – FAU

- Prof. Dr. Jürgen Herre  
Audio Coding
- Prof. Dr. Bernd Edler  
Audio Signal Analysis
- Prof. Dr. Meinard Müller  
Semantic Audio Processing
- Prof. Dr. Emanuel Habets  
Spatial Audio Signal Processing
- Prof. Dr. Frank Wefers  
Virtual Reality
- Dr. Stefan Turowski  
Coordinator AudioLabs-FAU



## Related Courses

### Audio Processing Laboratory

The objective of this lab course is to give students a hands on experience in audio processing.

- Offered every semester
- Short-Time Fourier Transform
- Speech Enhancement
- Statistical Methods
- Speech Analysis
- ...

Registration via StudOn is mandatory!

### Audio Processing Seminar

Various applications within audio and acoustic signal processing.

- Offered every semester
- Advanced topics
- Require lecture on DSP, audio, ...
- Also music-related topics
- ...

Registration via StudOn is mandatory!



Registration on studOn is mandatory!

## Related Courses

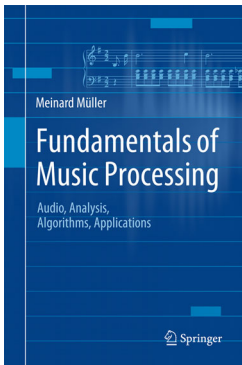
- **Speech Enhancement**  
Prof. Dr. Emanuel Habets  
AudioLabs
- **Advanced Topics in Perceptual Audio Coding**  
Prof. Dr. Jürgen Herre  
AudioLabs
- **Music Processing – Synthesis**  
Maximilian Schäfer (Prof. Dr.-Ing. Rudolf Rabenstein)  
Lehrstuhl für Digitale Übertragung (LMS)

## Lecture: Music Processing Analysis (MPA)

[https://www.audiolabs-erlangen.de/fau/professor/mueller/teaching/2019w\\_mpa](https://www.audiolabs-erlangen.de/fau/professor/mueller/teaching/2019w_mpa)

- Dates, Material, Information ... → [See website!](#)
- Time: Mo 16-18
- Mandatory elective course for CME, I&K, EEI, and ASC  
Credits: 2,5 ECTS
- Vertiefungsmodul Informatik (Master of Science)  
Medieninformatik, Mustererkennung  
Credits: 5 ECTS (Lecture & Exercise, MPA-LE)  
Time (Exercise): Mo 14-16
- Oral exam

## Book: Fundamentals of Music Processing



Meinard Müller  
Fundamentals of Music Processing  
Audio, Analysis, Algorithms, Applications  
483 p., 249 illus., hardcover  
ISBN: 978-3-319-21944-8  
Springer, 2015

Accompanying website:  
[www.music-processing.de](http://www.music-processing.de)

## Book: Fundamentals of Music Processing

Chapter	Music Processing Scenario
1	Music Representations
2	Fourier Analysis of Signals
3	Music Synchronization
4	Music Structure Analysis
5	Chord Recognition
6	Tempo and Beat Tracking
7	Content-Based Audio Retrieval
8	Musically Informed Audio Decomposition

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## Software & Audio: FMP Notebooks

**FMP Notebooks**  
Python Notebooks for Fundamentals of Music Processing

The FMP notebooks offer a collection of educational material closely following the textbook [Fundamentals of Music Processing \(FMP\)](#). This is the starting website, which is opened when calling <https://www.audiolabs-erlangen.de/FMP>. Besides giving an [overview](#), this website provides information on the license, the main contributors, and some links.

<https://www.audiolabs-erlangen.de/FMP>